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No. 3

MERCHANT SHIP AND NAVAL CONSTRUCTION.

Since the 1903 ship building edition of the Marine Review was published a great number of the lesser kind of naval vessels, such as torpedo boats, torpedo boat destroyers and submarine boats, have been completed, so that the list, now building, so far as number is concerned, is less than a year ago; but a very substantial program remains, for of thirty-eight on the constructive list thirteen are first-class battleships, eight armored cruisers, three protected, and four second-class cruisers. Of the ten others two are gunboats, three training vessels and five are torpedo craft. All of the submarines have been completed and are either in commission or in the dock yards for repairs. The program, therefore, is heavier this year as regards displacement and lighter as regards horse power. This is due to the fact that so many of the torpedo boats, which have tremendously disproportionate horse power to their displacement, are off the stocks.

The displacement of the vessels building is 354,214 tons, as against 284,943 tons for last year; and the horse power is 404,100 as against 448,720 for last year. The cost of the vessels now building, exclusive of armor and armament, is \$88,284,516, as against \$77,199,516 for last year—and there is still to be added the cost of three training vessels, building in navy yards, and two battleships, Mississippi and Idaho, contracts for which have not yet been let to the ship builders. During the year the following vessels were added to the active list of the navy: Battleships Maine and Missouri; monitors, Nevada and Florida; second-class cruisers Cleveland and Tacoma; torpedo boats, Hopkins, Hull, Lawrence, Macdonough and Tingey; submarine boats, Plunger, Adder, Grampus, Holland, Moccasin, Pike, Porpoise and Shark.

In merchant work on the seaboard there is little encouraging to report. On the contrary the situation is especially discouraging, for there is not a single new order of any importance to chronicle. There is not now, and has not been for two years and more, an order given for a vessel for the foreign trade of the United States. Whatever in that line may be observed in the summary of ship building on the following pages was there a year ago. The two vessels which the New York Ship Building Co., Camden, N. J., is building for the Pacific Mail Steamship Co.—Mongolia and Manchuria—are not new orders. They were taken over while on the stocks by the Pacific Mail Steamship Co., the original contract for them having been let by the Atlantic Transport Co. They were sold to the Pacific Mail Steamship Co. by the International Mercantile Marine Co. when it took over the Atlantic Transport Line. The Missouri, building for the Atlantic Transport division of the International Mercantile Marine service, at the yard of the Maryland Steel Co., Sparrow's Point, Md., was reported in last year's summary, as were also the side-wheel steamer and freighter building at the yard of the Fore River Ship & Engine Co., Quincy, Mass., for the New York, New Haven & Hartford Railroad Co. The Maryland Steel Co., however, has considerable work on hand. It has made a specialty of suction dredges and has secured contracts to build five of them for the United States government. It is not to be understood, however, that ship building on the seaboard is altogether dead. While the big yards have not had much to do, there is, of course, the continual wastage in coastwise vessels which must be replaced by the product of American ship yards; and the builders of wooden vessels have been fairly busy throughout the year. But the showing is such as to prove that the United States occupies a most ignoble position in the world's output of ships and it will continue to do so so long as it pursues the strange policy of being a protective country which declines to protect one of its most important industries—that of shipping.

VESSELS UNDER CONSTRUCTION FOR THE UNITED STATES NAVY.

Name of vessel.	Where and by whom building.	Probable date of completion.	Dimensions, ft.			Displacement, tons.	Indicated horse power.	Contract speed, knots.	Type of engine.	Type of boilers	Contract price exclusive of armor and armament.
			L'th	W	L						
Battleships.											
Ohio.....	Union Iron Works, San Francisco	Mar., 1902	388	72.2	23.6	12,440	16,000	18	Twin screw, trip. exp.	12 Thornycroft	\$2,899,000
Nebraska.....	Moran Bros. Co., Seattle	June, 1904	435	76.10	24	15,320	19,000	19	Twin-screw, trip. exp.	24 Bab. & Wil.	3,723,600
Virginia.....	Newport News Works, Virginia	June, 1904	435	76.10	24	15,320	19,000	19	Twin-screw, trip. exp.	24 Bab. & Wil.	3,590,000
Georgia.....	Bath Iron Works, Bath, Me.	June, 1904	435	76.10	24	15,320	19,000	19	Twin-screw, trip. exp.	24 Bab. & Wil.	3,590,000
New Jersey.....	Fore River Co., Quincy, Mass.	June, 1904	435	76.2	24	14,600	19,000	19	Twin-screw, trip. exp.	24 Bab. & Wil.	3,405,000
Rhode Island.....	Fore River Co., Quincy, Mass.	June, 1904	435	76.2	24	14,600	19,600	19	Twin-screw, trip. exp.	24 Bab. & Wil.	3,405,000
Connecticut.....	U.S. Navy Yard, New York	Feb., 1906	450	76.9	24.5	16,000	16,500	18	Four-cyl., trip. exp.	12 Bab. & Wil.	4,212,000
Louisiana.....	Newport News Works, Virginia	Mar., 1906	450	76.9	24.5	16,000	16,500	18	Four-cyl., trip. exp.	12 Bab. & Wil.	3,990,000
Vermont.....	Fore River Co., Quincy, Mass.	Dec. 20, 1906	450	76.10	24.6	16,000	16,500	18	Twin-screw, trip. exp.	12 Bab. & Wil.	4,179,000
Kansas.....	New York S. B. Co., Camden, N.J.	Dec. 16, 1906	450	76.10	24.6	16,000	16,500	18	Twin-screw, trip. exp.	12 Bab. & Wil.	4,165,000
Minnesota.....	Newport News Co., Virginia	Dec. 20, 1906	450	76.10	24.6	16,000	16,500	18	Twin-screw, trip. exp.	12 Bab. & Wil.	4,110,000
Mississippi.....	Contract not yet awarded		375	77	24.8	13,000	10,000	17	Twin-screw, trip. exp.	8 Bab. & Wil.	
Idaho.....	Contract not yet awarded		375	77	24.8	13,000	10,000	17	Twin-screw, trip. exp.	8 Bab. & Wil.	
Armored Cruisers.											
Pennsylvania.....	Cramp & Sons, Philadelphia	June, 1904	502	70	24.6	13,800	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,890,000
Colorado.....	Cramp & Sons, Philadelphia	June, 1904	502	69.6	24.6	13,400	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,730,000
California.....	Union Iron Works, San Francisco	June, 1904	502	70	24.6	13,800	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,800,000
South Dakota.....	Union Iron Works, San Francisco	June, 1904	502	69.6	24.6	13,400	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,750,000
West Virginia.....	Newport News Works, Virginia	June, 1904	502	70	24.6	13,800	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,885,000
Maryland.....	Newport News Works, Virginia	June, 1904	502	69.6	24.6	13,400	23,000	22	Twin-screw, trip. exp.	30 water-tube	3,775,000
Tennessee.....	Cramp & Sons, Philadelphia	Aug. 9, 1906	502	72.10	25	14,500	23,000	22	Twin-screw, trip. exp.	16 Bab. & Wil.	4,035,000
Washington.....	New York S. B. Co., Camden, N.J.	Aug. 10, 1906	502	72.10	25	14,500	23,000	22	Twin-screw, trip. exp.	16 Bab. & Wil.	4,035,000
Protected Cruisers.											
St. Louis.....	Neafie & Levy, Philadelphia	June, 1904	424	66	23.6	10,000	21,000	22	Twin-screw, trip. exp.	16 water-tube	2,740,000
Milwaukee.....	Bath Iron Works, Bath, Me.	June, 1904	424	66	23.6	10,000	21,000	22	Twin-screw, trip. exp.	16 water-tube	2,750,000
Charleston.....	Newport News Works, Virginia	June, 1904	424	66	23.6	10,000	21,000	22	Twin-screw, trip. exp.	16 water-tube	2,741,000
2nd Class Cruisers.											
Denver.....	Neafie & Levy, Philadelphia	July, 1902	292	44	15.9	3,200	4,700	16.5	Twin-screw, trip. exp.	6 water-tube	1,080,000
Galveston.....	Wm. R. Trigg Co., Richmond	Jan., 1902	292	44	15.9	3,200	4,700	16.5	Twin-screw, trip. exp.	6 water-tube	1,027,000
Chattanooga.....	Lewis Nixon, Elizabeth, N.J.	July, 1902	292	44	15.9	3,200	4,700	16.5	Twin-screw, trip. exp.	6 water-tube	1,039,966
Des Moines.....	Fore River Co., Quincy, Mass.	July, 1902	292	44	15.9	3,200	4,700	16.5	Twin-screw, trip. exp.	6 water-tube	1,065,000
Gunboats.											
Dubuque.....	Gas Engine & Power Co., Morris Heights, N.Y.	Nov. 29, 1904	174	35	12.3	1,085	1,000	12	Twin-screw, trip. exp.	2 Bab. & Wil.	295,000
Paducah.....	Gas Engine & Power Co., Morris Heights, N.Y.	Mar. 6, 1905	174	35	12.3	1,085	1,000	12	Twin-screw, trip. exp.	2 Bab. & Wil.	355,000
Steel Training Ships.											
Cumberland.....	U.S. Navy Yard, Boston		176.5	45.8	16.5	1,800			Sail power		
Intrepid.....	U.S. Navy Yard, Mare Island		176.5	45.8	16.5	1,800			Sail power		
Wooden Training Brig.											
Boxer.....	U.S. Navy Yard, Portsmouth		108	29.11	9.6	345			Sail power		
Torpedo Craft.											
Goldsborough.....	Wolff & Zwicker, Portland, Ore.	Dec., 1900	195	20.5	5	247	6,000	30	Twin-screw, trip. exp.	3 Thornycroft	214,000
Springham.....	Harlan & Hollings, Wilmington	Dec., 1900	225	22	6.6	340	7,200	30	Twin-screw, trip. exp.	4 Thornycroft	236,000
Blakely.....	Geo. Lailey & Sons, S. Boston	Jan., 1901	175	17.6	4.8	165	3,000	26	Twin-screw, trip. exp.	3 Normand	159,400
Nicholson.....	Lewis Nixon, Elizabeth, N.J.	Jan., 1901	175	17	4.6	174	3,000	26	Twin-screw, trip. exp.	3 water-tube	165,000
O'Brien.....	Lewis Nixon, Elizabeth, N.J.	Jan., 1901	175	17	4.6	174	3,000	26	Twin-screw, trip. exp.	3 water-tube	165,000
						354,214	404,100				\$88,284,516

LESS THAN FOUR MILLIONS IN ORDERS ON LAKES.

At this time a year ago ship yards of the great lakes had orders for sixty-two vessels, valued at \$13,491,500. Now the number of orders in hand is only twenty-five, many of them for small vessels, and the aggregate value only \$3,970,500. In the list of a year ago there were forty-eight freighters, capable of carrying together in a single trip 230,950 gross tons on 18 ft. draught. In this year's summary there are only ten freighters of a combined capacity of 63,400 tons. In January a year ago the American Ship Building Co. alone had orders for thirty-nine freighters, costing \$9,565,000. Now there are only seven freighters of 50,500 tons capacity on their order list and the aggregate value of these is \$2,175,000. The American company is building only one passenger steamer. They have under way, however, a very large job of a passenger kind in the lengthening of the side-wheel steamer City of Buffalo at the Detroit works. Important alterations are also being made in the steamers Hanna, Reis and Merida, all large freighters. From these vessels one boiler is being removed in each case and the dimensions of cylinders cut down; this with a view to economy in operation from a fuel standpoint. The Merida is one of a few vessels of the lakes that have engines amidships. Her engines are being moved aft.

Among the independent yards the Craigs, as will be noted, have a fair amount of work on hand. They are building two passenger steamers for Lake Michigan service—one for the Graham & Morton Transportation Co. to be named City of Benton Harbor, to run from Chicago to Benton Harbor, and the other for the Indiana Transportation Co. to run from Chicago to Michigan City, Ind. In addition they are to build a cargo steamer 406 ft. long for a company in which they are large stockholders, and a steel yacht and a steel tug for themselves. The Great Lakes Engineering Works, Detroit, has one cargo steamer under way for Frank Seither and others of Cleveland, to be named R. W. England. They are also to build a steel floating dry dock 450 ft. long as a part of their ship yard equipment and will, when the slips under way are completed, have capacity for building six 400-ft. steamers at once. Johnston Bros., Ferrysburg, Mich., are building a dredge for the United States government, to be 161 ft. long, 36 ft. beam and 4 ft. deep. Since the last ship building edition of the Review the Columbia Iron Works, Port Huron, Mich., has ceased its existence as a going concern. It had completed one steamer, had about finished another and had a cargo steamer under way for Mr. J. C. Gilchrist, with an order on its books for a second one for Mr. Gilchrist when financial difficulties overtook it and it was unable to meet its obligations. The plant is now the subject of litigation.

The Canadian ship yards on the great lakes are comfortably busy. The Polson Iron Works, Toronto, is building a fishing cruiser and a lightship for the Dominion government, a ferryboat for the North Vancouver Ferry Co., a river barge for the Roman Catholic Mission, Peace river district, and a yacht. The Bertram Engine Works Co., Toronto, is building a cargo steamer, Canadian canal size, 256 ft. long, for the grain trade; a tug for the Upper Ottawa Improvement Co., Ottawa; and a ferry steamer for Wolfe Island township. In addition they are very busy supplying engines and boilers for a number of steamers. The Collingwood Ship Building Co., Collingwood, Ont., is building two steel tugs—one for the Montreal Transportation Co., Montreal, and the other for the Georgian Bay Lumber Co., Waubaushene, Ont. The Calvin Co., Garden Island, Ont., is building a paddle-wheel steamer, 140 ft. long, for its own use. The Canadian Ship Building Co., Toronto, is a new enterprise of which Mr. A. Angstrom is general manager. Its main buildings are nearly completed and about 90 per cent. of its machinery is on hand. Owing to the depressed state of general business no contracts of any account have been taken, though the company is now figuring with several parties in regard to new vessels.

Building at the Several Yards of the American Ship Building Co. of Cleveland.

To be built at	Type.	Dimensions in feet.				Dimensions of Engines.	Boilers—Dimensions in feet and inches.	Draft.	Steam pressure pounds.	Capacity, gross tons.	Value.	For whom building.
		Over all.	Keel.	Beam.	Depth.							
Lorain.	Cargo stmr.	560	540	56	32	18½, 28½, 43½, 66x42 ..	Two Bab. & Wilcox ...	Induced	250	10,000	\$470,000	A. B. Wolvin, Duluth.
Lorain ...	Cargo stmr.	494	474	52	29	22½, 36, 60x42	Two Scotch, 13-9x11-6 ...	Ellis & Eaves.	180	8,600	340,000	G. A. Tomlinson, Duluth.
Lorain.	Cargo stmr.	440	420	50	28	22, 35, 58x40	Two Scotch, 13-2x11-6 ...	Ellis & Eaves.	170	6,800	280,000	W. A. Hawgood, Cleveland.
Cleveland.	Cargo stmr.	440	420	50	28	22, 35, 58x40	Two Scotch, 13-2x11-6 ...	Ellis & Eaves.	170	6,800	280,000	H. A. Hawgood, Cleveland.
Cleveland.	Cargo stmr.	436	416	50	28	22, 35, 58x40	Two Scotch, 13-2x11-6 ...	Ellis & Eaves.	170	6,750	270,000	C. O. Jenkins, Cleveland.
Cleveland.	Cargo stmr.	436	416	50	28	22, 35, 58x40	Two Scotch, 13-9x11-6 ...	Ellis & Eaves.	170	6,750	270,000	Charles L. Hutchinson, Cleveland.
Detroit....	Pckg frtr....	343	325	44	30	19, 27½, 40, 58x42	Three Scotch, 12x11-6 ...	Howden	210	4,800	265,000	Western Tr. Co., Buffalo.
Chicago...	Pass stmr...	243	225	40	16	20, 33, 54x36	Two Scotch, 13-2x11-6 ...	Ellis & Eaves.	180	.....	225,000	N. Mich. Tr. Co Chicago.

Building by Craig Ship Building Co., Toledo, O.

Toledo	Cargo stmr..	406	384	50	28	15, 23, 36, 55x40	Three Scotch, 11x11.....	.....	.....	5,600	255,000	Toledo Transfer Co.
Toledo	Pass stmr...	295	.....	43	14	36 and (2) 50x84.....	Four Scotch, 13x14 .....	.....	.....	.....	290,000	Graham & Morton Tr.Co., Chicago.
Toledo	Pass stmr...	200	185	32	14	15, 25, 42x36	Two Scotch, 11x11.....	.....	.....	.....	135,000	Indiana Tr.Co. Mich. City.
Toledo	Yacht	100	.....	.....	.....	7½, 12, 18x12.....	Water-tube .....	.....	.....	.....	15,000	J. F. Craig, Toledo.
Toledo	Tug.....	65	.....	.....	.....	14x16 high press.....	Fire box.....	.....	.....	.....	10,000	Craig Ship Bldg Co.

Building by Great Lakes Engineering Works, Detroit.

Detroit	Cargo stmr..	376	356	50	28	18, 28, (2) 32x36	Two Scotch, 12-10x12	175	5,000	225,000	Frank Seither, Cleveland.
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Building by Polson Iron Works, Toronto.

Toronto ...	Fish Prot'or.	176	22	14	13, 22, 36x21	Two Scotch, 11½x13.....	200	150,000	Dominion government.
Toronto ...	Ferry	148	.....	28	.....	14, 28x20	Two Scotch, 7½x10 .....	.....	.....	.....	55,000	North Vancouver Ferry Co.
Toronto ...	Lightship ..	124	.....	28	21	High pressure 23x21...	Navy type .....	.....	140	.....	100,000	Dominion government.
Toronto ...	Yacht	85	.....	.....	.....	Triple-exp.	Clyde boiler.....	.....	.....	.....	27,500	.....
Toronto ..	Barge	85	80	15	5	7, 14x10	Fitzgibbon .....	.....	.....	.....	10,000	Catholic mission.

Building by Collingwood Ship Building Co., Collingwood, Ont.

Collingw'd.	Tug	118	.....	23	13½	15, 25, 43x36	Two Scotch, 11x11-6 .....	.....	185	.....	60,000	Montreal Tr.Co., Montreal
Collingw'd.	Tug	86	.....	.....	.....	15, 30x24 .....	.....	.....	.....	.....	33,000	Geor. Bay Lumber Co., Waubaushene, Ont.

Building by Bertram Engine Works Co., Toronto.

Toronto ...	Cargo stmr	2'6	.....	.....	.....	15, 25, 42x30.....	Two Scotch, 10x11.....	.....	180	2,300	140,000	.....
Toronto ...	Ferry	120	.....	.....	.....	13, 16x36	One Scotch, 8x9.....	.....	150	.....	30,000	Wolf Island township.
Toronto ...	Tug	62	.....	.....	.....	Old engine.....	.....	.....	.....	.....	10,000	Upper Ottawa Imp. Co.

Building by Calvin Co., Garden Island, Ont.

Garden Is..	Paddle stmr.	140	130	20	9	Beam engine.....	25,000	Builders' account.
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Merchant Ship Building in Coast Ship Yards.

New York Ship Building Co., Camden, N. J.:

Twin-screw steel passenger and freight steamers Mongolia and Manchuria, duplicates, for the Pacific Mail Steamship Co.; length 615 ft.; two quadruple-expansion engines 30, 43, 63 and 89 in. in diameter by 60 in. stroke; four single-ended and four double-ended Scotch boilers; 14,000 H. P.; gross tonnage 13,638; cost \$2,000,000.

Twin-screw steel suction dredge Barnard for the United States war department; length 198 ft.; cost \$275,000.

Single-screw suction dredge Atlantic for R. E. Perry of San Francisco; length 145 ft.; cost \$675,000.

Single-screw freight and passenger steamer Ontario for the Merchants & Miners Transportation Co. of Baltimore; length 310 ft.; triple-expansion engines and two double-ended boilers; cost \$415,000.

Five single-screw steel lightships for the United States lighthouse board; 120 ft. long; total cost \$410,000.

Maryland Steel Co., Sparrow's Point, Md.:

Twin-screw steel steamer Missouri for the Atlantic Transport Co., New York (International Mercantile Marine Co.); length 507 ft.; triple-expansion engines; two double-ended and two single-ended Scotch boilers.

Single screw steel steamer Conestoga for the Philadelphia & Reading Railroad of Philadelphia, Pa.; length 170 ft.; triple-expansion engines; two single-ended Scotch boilers.

Single-screw steel steamer Gen. Joseph E. Johnston for the quartermasters' department, United States army; length 130 ft.; compound engine; two single-ended Scotch boilers.

Two twin-screw suction dredges for the engineer's department, United States army; length 288 ft.; compound engines; four Scotch boilers.

Three twin-screw suction dredges for the engineer's department, United States army; length 177 ft.; compound engines; two single-ended Scotch boilers.

Twin-screw steamer for the Pennsylvania Railroad; length 113 ft.; triple-expansion engine; one Scotch boiler.

Delaware River Iron Ship Building & Engine Works, Chester, Pa.:

Steel steamship San Jacinto for the Mallory Line, 400 ft. long.

Steel steamer City of Macon for the Ocean Steamship Co. of Savannah; 392 ft. long.

Two steel steamers, duplicates, for the Ocean Steamship Co. of Savannah; each 392 ft. long.

Tug J. F. Hanson for the Ocean Steamship Co. of Savannah, Ga.; 100 ft. long.

Fore River Ship & Engine Co., Quincy, Mass.:

Side-wheel passenger steamer for the New York, New Haven & Hartford Railroad Co.; length 397 ft.; double inclined compound engines; six Scotch boilers; cost \$1,000,000.

Twin-screw steel freight steamer for the New York, New Haven & Hartford Railroad Co.; length 318 ft.; triple-expansion engines; eight Scotch boilers; cost \$400,000.

Three steel car floats for the New York, New Haven & Hartford Railroad Co.; length 317 ft. 11 in.; cost \$60,000.

The fourteen Scotch boilers mentioned are being built for the Fore River company by the New York Ship Building Co., Camden, N. J.

Harlan & Hollingsworth Co., Wilmington, Del.:

Steel screw ferry steamer Tuxedo for the Erie Railroad of New York; length 224 ft.; double compound engines; two Scotch boilers.

Steel screw ferry steamer for the United States Immigration Commission of New York; 160 ft. long; compound engine; two Scotch boilers.

Steel caisson for the League Island navy yard; length 105 ft.

In addition the company is building one set of side-wheel engines as well as boilers for a ferry boat building in Rio de Janeiro, Brazil; putting new boilers and new cylinders in the steamer David for the Donald Steamship Co. of New York; reboiling auxiliary schooner yacht for I. Fleischman, Jr., of Cincinnati; reboiling the steamship Neuces for the Mallory Line of New York.

William Cramp & Sons Ship & Engine Building Co., Philadelphia:

Single-screw steel harbor tug M. S. Quay for the Philadelphia harbor department; length 98 ft.; compound engine; one Scotch boiler.

Three single-screw steel transfer tugs for the New York, New Haven & Hartford Railroad, Harlem division; length 110 ft.; compound engine; one Scotch boiler.

Eastern Ship Building Co., New London, Conn.:

Twin-screw steel steamships Minnesota and Dakota for the Great Northern Steamship Co., Seattle, Wash.; length

630 ft.; gross tonnage, 21,000; twin-screw, triple-expansion engines; estimated horse power 10,000; cost \$2,500,000 each.

Two steel railway car floats for the New York, New Haven & Hartford Railroad Co., New Haven, Conn.; length 318 ft.; value \$75,000.

Crescent Ship Yard, Elizabethport, N. J.:

Twin-screw gunboats Tampico and Vera Cruz, duplicates, for the Mexican government; length 200 ft.; triple-expansion engines and two Mosher water-tube boilers.

Single-screw steamer Czarina for Charles Bryan of New York; length 166 ft.; triple-expansion engines; two Mosher water-tube boilers.

Screw ferryboat Plainfield for the Central Railroad of New Jersey; 200 ft. long; triple-expansion engines; one screw at each end; three Scotch boilers.

Side-wheel steamer Happy Day for Charles M. Schwab of New York; length 200 ft.; beam engine.

Ferryboat Goshen for the Erie Railroad; length 224 ft.; triple-expansion engines; one screw at each end; two Scotch boilers.

Townsend-Downey Ship Building Co., Shooter's Island, New York:

Steel steam ferry boat Meteor; 100 ft. long; cost \$50,000; compound engines; Scotch boilers.

Steel screw lighthouse tender Crocus for the United States lighthouse board; length 167 ft.; compound engines; Scotch boilers.

Two steel bulk oil barges for the Standard Oil Co.; length 360 ft.; cost \$300,000.

Steel auxiliary schooner yacht Atlantic for Wilson Marshall; 184 ft. 6 in. long; triple-expansion engines; Almy water-tube boilers; cost \$140,000.

Bronze auxiliary schooner yacht for Chester W. Chapin; 113 ft. long; gas engine; cost \$57,000.

Neafie & Levy Ship & Engine Building Co., Philadelphia, Pa.:

Single-screw steel state quarantine steamer Governor Pennypacker for the state of Pennsylvania; length 90 ft.; compound engine; cost \$37,000.

Single-screw steel towing steamer Wyomissing for the Philadelphia & Reading railway; 115 ft. long; compound engine.

Four duplicate twin-screw steel steamers for the quartermaster's department, United States army; length 150 ft.

Single-screw steel towing steamer for the Pennsylvania Railroad; length 90 ft.

Burlee Dry Dock Co., Port Richmond, Staten Island, New York:

Single screw steel steamer Arlington for the Erie Railroad; length 224 ft.; two compound engines 18, 38 by 28 in.; two Scotch boilers, 12 ft. 9 in. by 12 ft. 9 in.

Two single-screw steel tugs for the Erie Railroad; length 115 ft.; one compound engine, 20, 42 by 28 in.; one Scotch boiler 14 ft. 6 in. by 12 ft. 9 in.

Steel single-screw tug for Cook & Munson Steamship Co.; 137 ft. long; triple-expansion engine 16, 25 and 42 in. in diameter by 30 in. stroke; one Scotch boiler 14 ft. 6 in. by 12 ft.

Single-screw steel tug for stock account; 95 ft. long; one compound engine, 16 and 32 by 24 in.; one Scotch boiler 9 ft. 3 in. by 14 ft.

Baltimore Ship Building & Dry Dock Co., Baltimore, Md.

Two steel lighthouse tenders, Magnolia and Ivy, for the United States lighthouse board; 173 ft. 2 in. long; twin compound engines, 18 and 34 in. by 26 in.; two Scotch boilers in each boat, 12 ft. 6 in. in diameter and 12 ft. long.

Engines and boilers for a tug for P. Doherty & Co., Baltimore, Md.; triple-expansion engines, 12½, 20½ and 34 in. in diameter by stroke of 24 in.; one Scotch boiler 12 ft. by 11 ft.

Fulton Iron Works, San Francisco, Cal.:

Wooden passenger and freight steamer Elizabeth for E. T. Kruse, San Francisco, Cal.; 150 ft. long; compound engine; one Scotch boiler.

Wooden tug for Pacific Mail Steamship Co. of San Francisco; 115 ft. long; compound engine; one Babcock & Wilcox boiler.

The company is also building the machinery for the following steamers:

Wooden steamer Shasta for the E. K. Woods Lumber Co., San Francisco, Cal.; length 205 ft. 4 in.; triple-expansion engine; two Scotch boilers.

Wooden steamer Northland for the E. T. Dodge Co., San Francisco, Cal.; length 203 ft. 6 in.; triple-expansion engine; two Babcock & Wilcox boilers.

Wooden steamer for Sudden & Christensen of San Fran-

cisco; 215 ft. long; triple-expansion engines; two Scotch boilers.

Wooden freight and passenger steamer F. A. Kilburn for Watsonville Transportation Co., San Francisco, Cal.; length 136 ft.; four-cylinder, triple-expansion engine; two Scotch boilers.

Union Iron Works, San Francisco, Cal.:

Single screw steel steamer Like Like for the Wilder Steamship Co. of Honolulu; length 136 ft.; vertical fore and aft compound engine and one Scotch boiler.

Moran Bros. Co., Seattle, Wash.:

Building a number of boilers for marine installation and also a floating dry dock derrick.

United Engineering Works, San Francisco, Cal.:

Steel steamer Nushagak for the Alaska Packers' association; length 185 ft.; triple-expansion engines; two Scotch boilers.

Two wooden tug boats, each 55 ft. long; compound engines; one Scotch boiler.

Machinery for steamer San Gabriel for Wilmington Transportation Co.; 180 ft. long; four-crank triple-expansion engine; Babcock & Wilcox water-tube boilers.

Machinery for steamer Higgins; compound engine; one Scotch boiler.

American Car and Foundry Co., Jackson & Sharp plant, Wilmington, Del.:

Three car floats for the Pennsylvania railroad; length 250 ft.

Two car floats for the Philadelphia & Reading Railway Co.; length 176 ft.

One deck lighter for the Charles Warner Co.; length 110 ft.

Portland Ship Building Co., Portland, Me.:

Single screw tow boat Francis C. Henry for the Commercial Towboat Co., Portland, Me.; length 90 ft.; compound engine; one boiler.

Freight and passenger boat for Horpswell Steamboat Co., Portland, Me.; length 90 ft.; compound engine; upright boiler; cost \$18,000.

The company is also building both engines and boilers for these steamers.

Pusey & Jones Co., Wilmington, Del.:

Two standard steel screw vessels for harbor service of the quartermaster's department, United States navy; length 130 ft.; compound engine 20 and 40 in. in diameter by 24 in. stroke; two horizontal Scotch boilers.

Merrill-Stevens Co., Jacksonville, Fla.:

Light-draught side-wheel steel river freight steamer Washington A. Clark, for W. B. Smith Whaley, Columbia, S. C.; length 185 ft.; tandem compound engines; two Taylor water-tube boilers; cost \$50,000.

Steel stern-wheel combined dredge and snag boat Florida for the United States engineering department, Jacksonville, Fla.; length 150 ft.; two horizontal simple stern-wheel engines; two internal furnace Clyde boilers.

Twin-screw wooden ferry boat for the Jacksonville Ferry Co., Jacksonville, Fla.; length 110 ft.; two upright engines; Scotch boiler.

Greenport Basin & Construction Co., Greenport, N. Y.:

Wooden suction dredges St. John and Pensacola for the United States government; 200 ft. long; cost \$150,000.

Sloop-rigged yacht for Benjamin Atha of Newark, N. J.; length 41 ft.; cost \$3,500.

Wooden yacht for G. Peel of New York; length 61 ft.; 40 H. P. gasoline motor.

Kelley-Spear Co., Bath, Me.:

Four-masted wooden schooner for C. E. Bennett, Baltimore, Md.; 173 ft. long; cost \$42,000.

Three-masted wooden barge for the Baltimore & Boston Barge Co.; 230 ft. long; cost \$40,000.

Four-masted wooden schooner for J. S. Emory Co., Boston; 235 ft. long; cost \$80,000.

Four-masted wooden schooner for Nichols Bros., New York; 180 ft. long; cost \$42,000.

George A. Gilchrist, Belfast, Me.:

Wooden hydraulic dredge for the United States government; 162 ft. long; not self-propelling; two 11 by 11 Scotch boilers; cost \$35,000.

Mr. Gilchrist is also building four 10 by 11 Scotch boilers for the steamer Puritan of Benton Harbor.

J. S. Ellis & Son, Tottenville, Staten Island, New York.:

Wooden tug boat for Russell Bros., 1 Vernon avenue, Long Island City, New York; 81½ ft. long; engine 18 by 22 in.; cost \$16,000.

The firm has prospects of building two other tugs but contracts have not yet been signed.

William McKie, 100 Border street, East Boston, Mass.:

Side-wheel steamer G. T. Morse for the Eastern Steamship Co., Boston, Mass.; length 214 ft.; cost \$110,000.

Thomas McCosker & Co., Baltimore, Md.:

Wooden tug for James Clark Co., Baltimore, Md.; 110 ft. long; fore and aft compound engine 15 and 30 by 24 in.; cost \$30,000.

Wooden tug for P. Dougherty & Co. of Baltimore, Md.; length 115 ft.; triple-expansion engine 12½, 25 and 35 in. in diameter by 24 in. stroke; cost \$40,000.

Ward Engineering Works, Charleston, W. Va.:

Steel twin-screw, light draught river towboat for the United States government; 150 ft. long; triple-expansion engine and Ward boiler; cost \$40,000.

Theodore Crane's Sons Co., Brooklyn, N. Y.:

Wooden pocket dump scow for W. H. Beard Dredging Co., New York; 122 ft. long.

Wooden railroad car float for the Lehigh Valley railroad; 300 ft. long.

H. & N. Y. T. Co., Hartford, Conn.:

Wooden barge for the H. & N. Y. T. Co.; length 150 ft.; cost \$12,000.

M. B. McDonald, Mystic, Conn.:

Four-masted schooner for E. A. Davis, Somerset, Mass.; length 190 ft.; cost \$40,000.

Four-masted schooner for M. L. Gilbert, Baltimore, Md.; length 200 ft.; cost \$45,000.

Four-masted schooner for Miller Houghton of New York; length 190 ft.; cost \$40,000.

Three-masted schooner for E. P. Boggs, Boston, Mass.; length 185 ft.; cost \$36,000.

Joseph Supple, Portland, Ore.

Wooden stern-wheel steamer for U. S. Raber, Glenn's Ferry, Idaho; length, 40 ft.; cost \$3,000; one stern wheel engine 4 by 16 in.; one Clyde boiler.

One dredge hull for U. S. Raber, Glenn's Ferry, Idaho; 100 ft. long; cost \$6,000.

Propeller launch for Delart Bros., Portland, Ore.; 54 ft. long; cost \$3,000; upright engine, 8 by 8 in.; one Scotch boiler.

Thames Towboat Co., New London, Conn.:

Wooden tug Paul Jones for the Thames Towboat Co., New London, Conn.; 187 ft. long; one triple-expansion engine 21, 31 and 55 in. by stroke of 36 in.; two boilers 12 ft. long and 14 ft. diameter.

Wooden tug for the Thames Towboat Co., New London, Conn.; length 68 ft.

Samuel Ayers & Son, Nyack, N. Y.:

Launch Edithia for J. Hanan; 114 ft. long; kerosene motor.

Launch Larata for M. G. Foster; 91 ft. long; kerosene motor.

Launch Sea Gull for S. Hoyt; 36 ft. long; electric motor.

E. S. Crosby, Bath, Me.:

Four-masted wooden schooner Henry F. Kreger for E. S. Crosby, Bath, Me.; length 220 ft.; cost \$64,000; donkey engine for hoisting purposes.

Four-masted schooner for E. S. Crosby, Bath, Me.; length 225 ft.; cost \$68,000.

Raritan Dry Dock Co., Perth Amboy, N. J.:

Two wooden barges for Edward Moore, No. 1 Broadway, New York; length 115 ft.; cost \$5,800 each.

Four wooden barges for B. McLain, No. 1 Broadway, New York; length 110 ft.; cost \$5,300 each.

E. & I. K. Stetson, Bangor, Me.:

Four-masted wooden schooner for Crowell & Thurlow, Boston, Mass.; length 195 ft.; cost \$65,000.

Four-masted wooden schooner, E. & I. K. Stetson as agents; length 165 ft.; cost \$45,000.

Cobb, Butler & Co., Rockland, Me.:

Wooden schooner Edwin H. Cole for Crowell & Thurlow, Boston, Mass.; length 226 ft.; cost \$35,000.

Four-masted schooner for Donnell & McKown, Boston, Mass.; 185 ft. long; cost \$55,000.

H. M. & R. L. Bean Co., Camden, Me.:

Two schooners, one 240 ft. keel and the other 260 ft. keel, for the Coastwise Transportation Co., Boston, Mass.; one to cost \$112,000 and the other \$120,000.

A. M. Webster, Vinal Haven, Me.:

Three-masted wooden schooner Margaret M. Ford for J. B. Ford, 67 Main street, Cambridge, Mass.; 152 ft. long; hoisting engine; cost \$25,000.

Washburn Bros., Thomaston, Me.:

Four-masted wooden schooner Helen Thomas for Washburn Bros., as managing agents; length 210 ft.; cost \$24,000.

S. Gildersleeve, Gildersleeve, Conn.:

Wooden coal barge; 121 ft. long; cost \$6,500; wooden coal barge; 105 ft. long; cost \$5,000; both for sale.

Warren Sawyer, Milbridge, Me.:

Four-masted wooden schooner for G. A. Tunell, Philadelphia, Pa.; length 218 ft.; cost \$65,000.

Tarr & James, Essex, Mass.:

Wooden schooner for Capt. Leavitt W. Hines, Central Argyle, Nova Scotia; length 113 ft.

James M. Bayles & Son, Port Jefferson, N. Y.:

Schooner yacht Palestine for Henry C. Tinker of New York; length 100 ft.; cost \$35,000.

F. S. Bowker & Son, Phippsburg, Me.:

Three-masted wooden schooner for South Gardiner Lumber Co., Phippsburg, Me.

William Skinner & Sons Ship Building & Dry Dock Co., Baltimore, Md.:

Wooden car float for the Baltimore & Ohio railroad; 285 ft. long; cost \$30,000.

G. G. Deering, Bath, Me.:

Now cutting frame in Maine and Canada for a vessel of 1,900 tons register.

Sawyer Bros., Milbridge, Me.:

Three-masted wooden schooner for Henry Lord; 150 ft. long; cost \$25,000.

Charles V. Minott, Phippsburg, Me.:

Five-masted wooden schooner for stock account; 260 ft. long; cost \$90,000.

Oakland Ship Yard, Southern Pacific Railway, San Francisco, Cal.:

Two car transfer floats for the Southern Pacific railway; length 273 ft.

FLOATING DRY DOCK AT MOBILE.

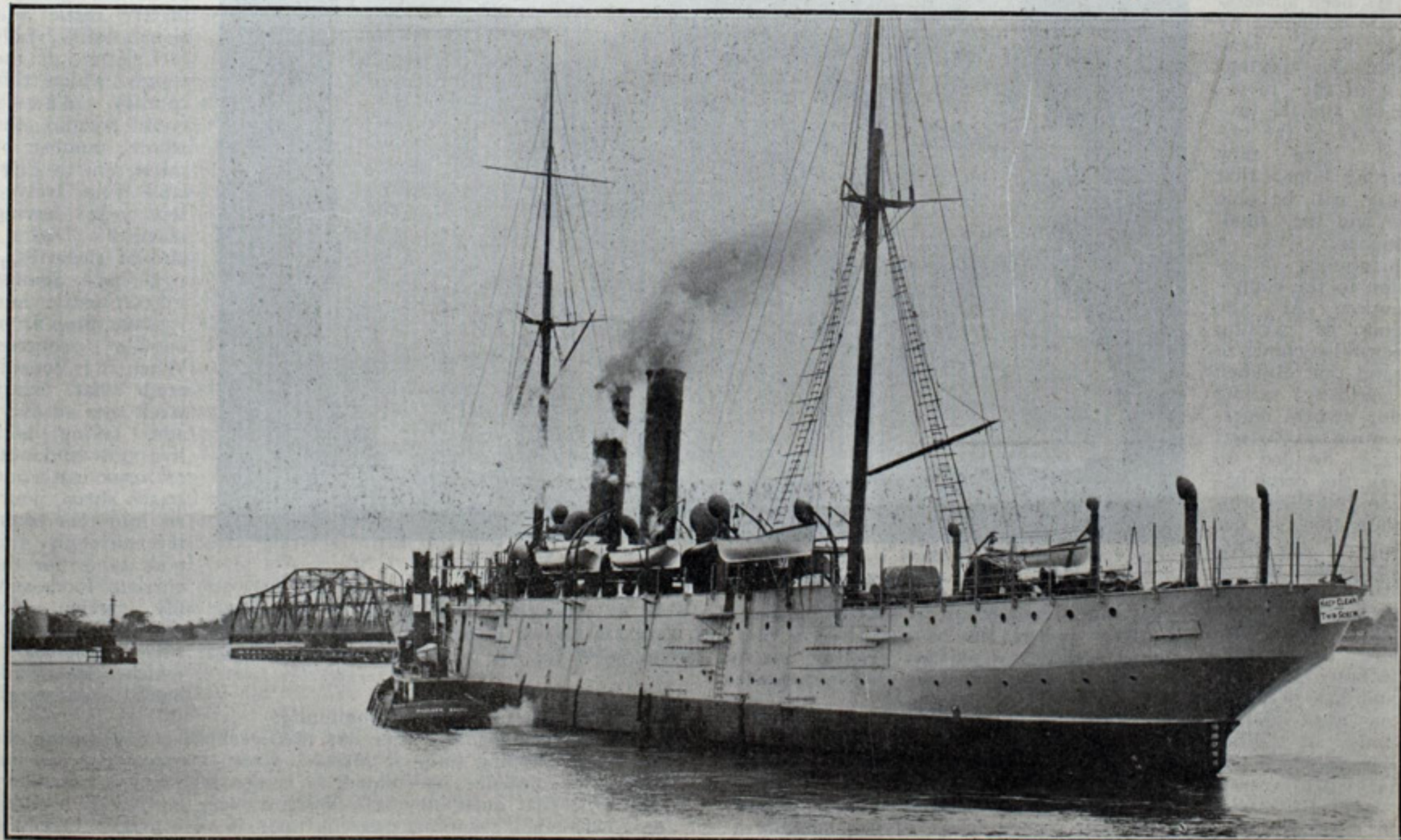
The Ollinger & Bruce Dry Dock Co., Mobile, Ala., is building a floating dry dock, which, when finished, will enable the company to dock any ship that is likely to visit Mobile. The dimensions of the dock will be as follows: Length of hull, 231 ft.; length including outriggers, 300 ft.; width, 85 ft.; depth of hold 11 ft.; draught of water over 3-ft. keel blocks, 15 ft. at mean low tide; estimated lifting capacity, 3,000 tons deadweight. The company expects to have the dock in operation by May of the present year. It is quite probable that the company will later build a 100-ft. extension to the dock, making it 400 ft. long and capable of lifting 5,000 tons deadweight. The dock will be modern in all respects. The pumping plant will consist of ten submerged centrifugal pumps of 15 in. suction, capable of discharging 3,000,000 gallons per hour, thereby permitting of the maximum load being decked in about thirty minutes. The company has just installed a complete air equipment for the operation of pneumatic tools.

BUILDING TWO WOODEN SUCTION DREDGES.

The Greenport Basin & Construction Co., Greenport, N. Y., is to build two government dredges, the contract price of which, together, completed, is \$300,000. This work will keep the company busy for fourteen months and will necessitate the employment of 150 additional men. The dredges are sea-going suction dredges and are intended for use in the St. John's river and Pensacola harbor, Florida. The Greenport company will build only the hulls, the James Reilly Repair & Supply Co. of New York furnishing the engines, boilers, pumps and auxiliary machinery. Both dredges are duplicates and their dimensions are as follows: Length over all, 200 ft.; length between perpendiculars, 185 ft.; beam, molded, 40 ft.; depth, 23 ft. Keel and frames are to be of oak and the planking, deck beams, ceiling and shell of yellow pine. The masts will be of Oregon pine. Each dredge will have two deck houses, one forward and the other aft, for the accommodation of the officers. The propelling engines will be fore and aft compound with cylinders 22 and 44 in. diameter by stroke of 30 in., developing about 1,000 H. P. Steam will be supplied by two Scotch boilers, 14 ft. in diameter and 12 ft. long. Condensers and pumps for the boilers will be independent. The dredging apparatus will consist of two 18-in. rotary pumps, driven by direct-connected compound engines of the same type as the propelling engines, with cylinders 15 and 26 in. diameter and stroke of 18 in. Each dredge will have two holds, one forward of the engines and boilers and the other aft, each of which will have a gate at the bottom, opening outboard.

Two steel stern-wheel steamboats building on the Allegheny, (Pa.) wharf by the James Rees & Sons Co. for the Central American trade will soon be completed and start on their long trip to their destination, one going to Mexico, the other to Nicaragua, where they will be used in mercantile service on the rivers of those countries. The boats are of steel, 125 ft. long and 24 ft. beam, with a draught of from 3 to 4 ft. and are fitted with the Ohio river pattern of horizontal engines and stern-wheel. The boats are the sixtieth and the sixty-first the company has built for the Central and South American trade, and will reach their destination by water, although it was at first intended to ship them to New York, where they would have been loaded on steamers and finally assembled when they reached their destination. Instead they will be completed, steam down the Ohio and the Mississippi to New Orleans, and from there be towed across the gulf.

Charlestown navy yard is to add to its outfit within a short time one of the largest traveling cranes in New England. The contract has just been awarded to the American Hoist & Derrick Co. of St. Paul, Minn., for \$75,900. The arm will be about 105 ft. long and the outfit will be set upon a heavy sixteen-wheeled steel truck. The tracks will be laid around the new dry dock, and the 100-lb. rails will be placed 20 ft. apart. The crane will have a capacity for lifting a load of 40 tons at a distance of 85 ft. from the middle of the track, will be capable of traveling at the rate of 50 ft. per minute and can lift its full load at the rate of 7 ft. per minute.



DES MOINES, THE FASTEST OF THE SECOND-CLASS CRUISERS, SPEED 16.63 KNOTS.

[Built by Fore River Ship & Engine Co. Quincy, Mass.]

POWERFUL UNION OF SHIP OWNERS.

Nearly 4,000,000 tons of Sailing Ship Capacity in an Association that Seeks better Freights—Liverpool Shipping Letter.

Liverpool, Jan. 11.—There have been unexpected developments here within the past few days towards the formation of the proposed Sailing-Ship Owners' International Union, for the Liverpool ship owners have successfully overcome the opposition that was at first threatened, and by an overwhelming majority have decided for the union, and its object of raising sailing ship freights to a pay-level. London and Glasgow sailing ship owners having arrived this week at a like decision, there is now unanimity among the British owners of sailing craft for the ratification of the union, which will formally come into existence at the adjourned conference of European representatives, to be held in London on the 27th inst. The opposition to the union urges its impracticability, because of the diverse nationalities to be combined, and the difficulties of distance, mutual distrust and suspicion in the way of a common understanding; also that the French owners will have the best of the bargain, because they are not bound to accept a minimum rate on the outward voyage like the British owners. But these objections have been successfully combated by Mr. R. W. Leyland, the originator of the movement, and the promoters of the union have now strong hopes that they will be able to win the small minority to a unanimous adhesion to the combination. At the time of writing news also comes to hand that Bremen (Germany) sailing ship owners representing 140,000 tons have decided to join the combination, but they stipulate that 75 per cent. of the British and French firms must do likewise to command their support. In this connection Mr. Leyland has prepared

some most interesting statistics relating to the matter. The total number of sailing ships in Lloyd's Index on Nov. 12 last was 3,650, of which 1,735 were of over 1,000 tons net register, which is the limit of vessels eligible for enrolment in the union. Of these 770 (of 1,302,008 tons net register) are British, 227 (of 387,027 tons) are German, and 206 (of 366,084 tons) French, making a total of 1,198 ships of 2,055,119 tons net register. These are the three nations who are endeavoring to form the union, and should they be successful, there is every reason to believe that the Italians and Norwegians will come in, the former owning 155 ships of 219,369 tons net register, and the latter 168 ships of 213,029

tons. These five nations, therefore, own 1,521 ships of 2,487,517 tons net register, and as the deadweight carrying capacity of sailing ships may be reckoned in round figures at 50 per cent. over the net register, the total carrying capacity of the five nations is 3,731,265 tons. As an illustration of how a minimum rate of freight would act, assuming the union could have stayed the fall of freights to the extent of 5 shillings per ton over the ruinous rates that have prevailed during the last twelve months, ship owners would have benefited to the extent of £932,815. Strange

as it may appear, the project has met with the greatest opposition on the Mersey where the movement first originated, but this has now happily been overcome, and the operations of the union which is now virtually established will be watched with special interest, and at the same time some hope that the beneficial aims it has for international shipping will be realized.

Liverpool is essentially the port for the American meat trade, which has now attained enormous dimensions, and is valued at from £12,000,000 to £15,000,000 a year. During the past twelve months, 677 steamers have brought to this port 238,343 live cattle, 177,325 sheep, 1,868,041 sheep carcasses, and 1,234,017 quarters of beef. It may be news to many that notwithstanding these formidable figures, Liverpool's foreign trade in live cattle and sheep still falls far short of the supply which this country draws from Ireland, the whole number of cattle sent to England from Ireland last year having reached 894,319, and of sheep 834,193, as against 238,000 cattle and 177,000 sheep from outside sources. When it is considered that every week sees an average, taking both live and dead meat of 10,500 cattle and 40,500 sheep, poured into this country through this port alone for the current food supply, some idea may be formed of the importance which this trade has attained as af-

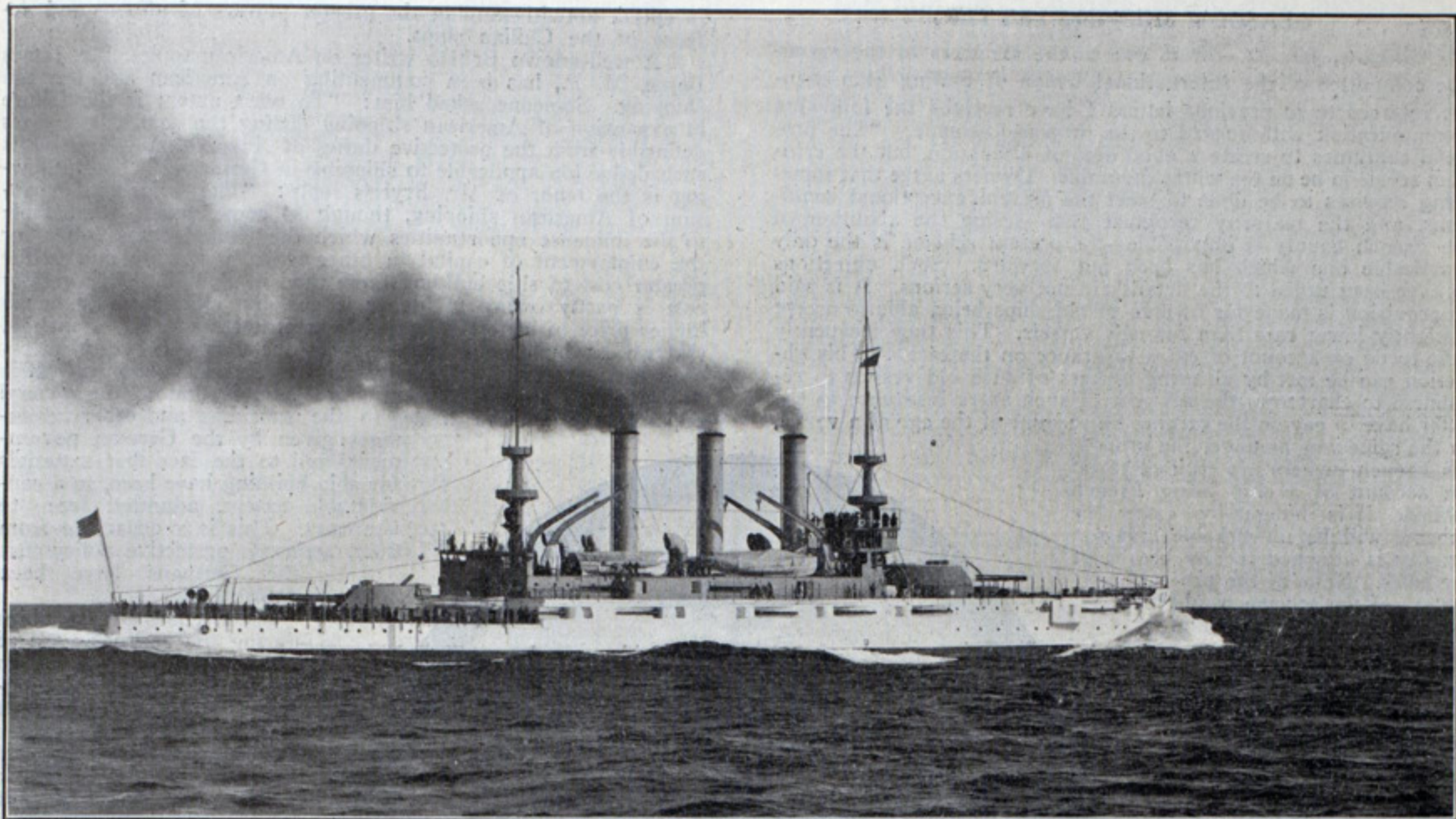


FOUNTAIN OF THE GREAT LAKES.

THIS EXCELLENT BIT OF MODELING IN CLAY WAS DONE BY STUDENTS AT THE CHICAGO ART INSTITUTE. IT HAS, OF COURSE, THE TECHNICAL FAULTS THAT ARE INSEPARABLE FROM STUDENT WORK, BUT THE CONCEPTION REVEALS FINE ORIGINAL POWERS. THE FIVE SISTERS TYPIFY THE FIVE LAKES, AND THE SOURCE AND FLOW OF THE WATERS IS MOST HAPPILY EXPRESSED.

fecting the welfare of the community.

A Liverpool ship owner has this week been denouncing the American shipping bills of Messrs. Greene and Sulzer as unscrupulous measures calculated to create international commercial strife that must inevitably destroy every vestige of friendliness between the nations entering upon it. He asserts that "the framers of these bills have shown such a disregard for every principle of international trade that it seems impossible to take the matter seriously until it is ascertained that the case is as represented and that there are other responsible members prepared to back up such monstrous proposals as those published. To



BATTLESHIP MISSOURI ON HER TRIAL TRIP.

Built by Newport News Ship Building & Dry Dock Co., Newport News, Va.]

[Photo copyrighted, 1903, by N. L. Stebbins, Boston.]

seriously formulate such measures for the levying of prohibitive tonnage taxes on all foreign ships and thus strike directly at friendly foreign competitors is inconceivable to free trade England. Should American legislators commit such an atrocity as to pass into law Messrs. Greene and Sulzer's bills, we in this country could not but look upon the act as a most unfriendly one, and the strongest evidence possible of the empty, bragging nature of the business men of the United States who appear to dread anything in the form of outright and straightforward competition." I give these observations as showing the feeling of some shipping men here upon America's proposed shipping nursery, and while the strong language will not find general endorsement, there is a consensus of opinion that legislation on the lines indicated is altogether unworthy of such an enlightened and great commercial country as the United States of America.

Capt. Alexander McKay, commodore of the Cunard fleet, having retired after thirty-three years service with the Cunard company, and having commanded no fewer than fourteen Cunarders, he has been succeeded in the command of the *Lucania* by Capt. Walt of the *Campania*. The appointment as commodore captain is, however, understood to be only temporary while the *Campania* is receiving her annual overhaul, the final selection having yet to be made by the directors.

On Thursday of last week Lord Strathcona opened the handsome new offices at Charing Cross, London, of the Canadian Pacific Railway Co. These new premises have a most imposing appearance, and are in every respect worthy to be the European traffic headquarters of the great railway undertaking which joins the Atlantic and Pacific seaboards of North America. In the building of this handsome structure which overlooks Trafalgar square, the world seems to have been ransacked for the materials which are used in the work. The ground floor is laid in mosaic and shows the arms of the dominion and provinces of Canada. There are alabaster mouldings from Derbyshire, the walls are lined with Grecian marble, with a dado of teak framing Cuban mahogany panels, the arch of the inglenook is from the Pyreneese, the columns from Greece, with basis of onyx from Brazil, the mouldings around the fireplace from Languedoc, and the chimney piece is from Sienna. Above the ground floor, the front of which is of polished Swedish granite, there are five stories which are reached by an electric lift, or by a staircase lined with marble from Devon, the dado coming from the Alps, and the wall lining from Italy. The doors throughout are of polished Canadian birch. Lord Strathcona reviewed the rapid development of the Canadian Pacific Railway during its short history, which he said was an assured success amongst the railways of the American continent. Not only did the line run from St. John's to the Pacific, but in connection with the route a line of boats—the *Empress* steamers—ran to China and Japan. More recently the company had taken up a line of steamers from Great Britain to Canada, so that they were not only a railway company, but a steamship company as well, and they were doing, he believed, a very great service to the commerce between the mother country, Canada, the far east and Australasia. Even now the communication between Great Britain and Canada was not what it ought to be. They required a much faster service of steamers as a complement to the railway across the continent, and the subsequent journey

east and south, and no doubt that would come in good time. Lord Strathcona eulogized the great work accomplished by Mr. Archer Baker, the European traffic manager, since he arrived in 1885 to consolidate the company's business and develop it upon larger lines.

SIDE-WHEEL STEAMER JAMES T. MORSE.

The Eastern Steamship Co., Boston, Mass., will very shortly have on its Rockland-Bar Harbor run the splendid side-wheel steamer *James T. Morse*, now building at the works of William McKie, East Boston, Mass., and designed by Calvin Austin, vice-president and general manager of the company. Her dimensions are: Length 214 ft.; beam, 30 ft.; depth, 12 ft. She is equipped with a beam engine, cylinder 51 in. diameter by stroke of 9 ft., built by the W. & A. Fletcher Co., Hoboken, N. J. It is estimated that her speed will be 18 miles an hour at 35 revolutions per minute. The steamer is constructed of wood, having oak frames and hard pine planking. Her engine room, on the main deck, is encased in iron. All the space on this deck forward of the aft companionway is designed for freight. From the companionway aft is a dining room 43 ft. long and extending the entire width of the vessel. The remainder of the space aft is occupied by a ladies' saloon and toilet rooms.

A glass-enclosed saloon extends about two-thirds of the length of the steamer. The smoking room is located in the forward part of the saloon. The purser's office is situated in the saloon directly forward of the steam dome. A walk outside extends completely around the saloon, inside the wheels, and is about 4 ft. in width. The wheel batteries are paneled and have the appearance of forming the inside of a stateroom. There are five large staterooms and one toilet on each side, which are a continuation forward and aft of the wheel batteries, the outside of the rooms being flush with the waterways.

The ship's officers are housed on the hurricane deck. Aft of the pilot house and extending the entire width of the house is the captain's room. Aft of the captain's room are the quarters for the mates, pilots, engineer and electrician. The kitchen is located directly under the dining room, but by means of pipes and ventilators the air is led from the kitchen through the after part of the engine room enclosure, thus removing completely every evidence of culinary employment. The steamer will be lighted throughout with electricity and will possess every modern convenience. The fittings and furnishings will be first class in every particular.

Sahara is the name selected for the large steel freighter, about 8,500 gross tons capacity, which the American Ship Building Co. is building for G. A. Tomlinson of Duluth. The steamer building at the Great Lakes Engineering Works, Detroit, for Frank Seither and others is to be named for Capt. R. W. England, who is interested in the Seither vessels. The company organized for the operation of this vessel will be known as the England Transit Co.

The Hanley Construction Co., Quincy, Mass., is building a tug for service in Cuban rivers of the following dimensions: Length, 57 ft.; beam, 14 ft.; depth, 4 ft.

GLASGOW SHIPPING LETTER.

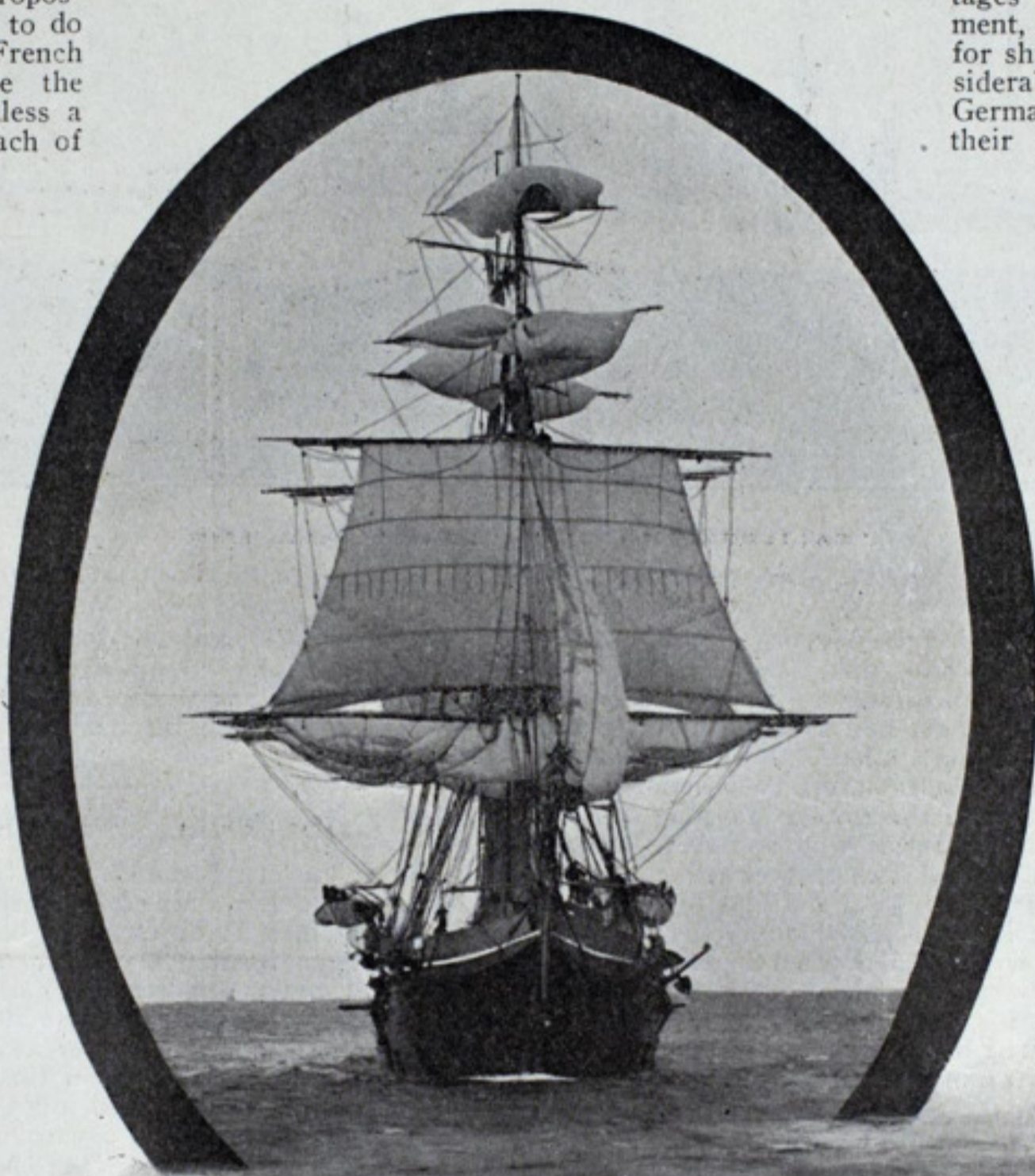
Glasgow, Jan. 11.—From one of the members of the executive committee of the International Union of Sailing Ship-Owners referred to in previous letters I have received the following communication with regard to the proposed scheme: "The proposal continues to create a good deal of discussion, but the criticism seems to be on the whole favorable. Owners agree that something requires to be done to meet the present exceptional conditions, and the majority recognize that—seeing the abolition of the French bounty is impossible—the present scheme is the only practicable one which has been put forward. Such objections as have been urged to the details are not very serious. It is said no provision is made for owners of old ships being able to accept a slightly lower rate than for new vessels. This they frequently have to do on account of extra insurance on the cargo. This objection can be met by allowing owners of such old vessels to reimburse to charterers the net cost of such extra insurance as the latter have to pay on the cargoes on account of the age of a vessel, in the same way as under the proposals French owners are entitled to do on account of a ship being French owned. It is thought by some the scheme will be unworkable unless a penalty is attached to any breach of the rules. None of the promoters of the scheme would really make any objection to a penalty provided it was substantial, say not less than £250 for each breach of the rules, but the difficulty is to enforce such a penalty, and moreover a penalty gives the idea that the rule may be broken provided the amount of it is paid. Is it not much better to trust to an honorable understanding among owners. It must, moreover, be borne in mind that in the present case it will be in no one's interest to charter under the minimum rate. Were freights to be fixed at a point where there is a substantial profit, one can quite understand someone being content with a little less profit in order to secure the business, but where the minimum is no more than sufficient to cover expenses, surely it is no one's interest to cut under that."

The two Argentine cruisers bought by Japan are not equal to the Chilean vessels purchased by the

in speed, notwithstanding the greater powers of offense and defense of the Chilean ships.

A well-known British writer on American topics, Mr. James Bryce, M. P., has been commenting on American and German shipping. Someone asked him: "To what extent is the failure in expansion of American shipping during the past thirty years deducible from the protective duties of America, and how far is such deduction applicable to shipping in Germany?" The following is the tenor of Mr. Bryce's reply: "The failure in expansion of American shipping, though to some extent attributable to the immense opportunities which the United States offer for the employment of capital in other ways, is mainly due to the greater cost of ship building there than in Britain. This greater cost is partly owing to higher wages, but chiefly to the much higher price of materials caused by a protective tariff. I am told that we can build ships here at from one-fourth to one-third less than the Americans. The growth of German shipping, which has attracted so much attention of late, is due to the general expansion of German trade, to the subsidies and other advantages given by the German government, and to the fact that materials for ship building have been, to a considerable extent, admitted free to Germany. This is a departure from their general protective policy that the Germans have been forced into."

Speed trials of warships during the past year are of great significance owing to the large number of high-speed vessels tested. Of thirty-seven vessels which have been subjected to speed tests, 28 attained speeds in excess of 21 knots, and of these twelve were cruisers, the remainder being torpedo boat destroyers and torpedo boats. Of the number seven were armored ships of about 23 knots. Prior to 1895 we had no ships, except torpedo boats, in the British navy with a speed exceeding 21 knots. High speeds came with the water-tube boiler. First the 22½-knot Powerful and Terrible, then the eight Diadems, the six Cressy cruisers of 21 knots and later the Drake



THE MONONGAHELA AT SEA.

[Copyright, 1903, by Enrique Muller.

British government. Even the difference in price is not commensurate with the difference in power. Japan is paying £1,500,000; Great Britain paid £1,850,000.

The Argentine ships are of 7,700 tons displacement, the Chileans are of 11,800 tons. One of the Argentine ships has four 8-in. guns where the Chilean vessels have four 10-in. guns. The other Argentine ship has a single 10-in. gun in the forward bar-bette and two 8-in. guns in her after turret. A speed of 20 knots was designed for the Argentine ships, but even with four 10-in. guns the first Chilean ship tried exceeded 20 knots. The Argentine ships have fourteen 6-in. quick-firers, while the Chilean vessels have the same number of 7.5-in. quick-firers. The Chilean ships have fourteen 14-pounders, while the Argentine ships have only twelve 12-pounders, and instead of two Maxims, as in the Argentines, the Chilean vessels have four 6-pounders, four pom-poms and four Maxims. Instead of a belt of 6-in. armor for two-thirds length, as in the Argentine ships, the Chilean ships are protected on the whole broadside, in the central part of the ship, for two-thirds the length, the arrangement being the Vickers concentrated casemate system. The Argentines have cylindrical boilers, which partly accounts for the absence of superiority

and County classes. The new ships of 1903 all passed their tests without any trouble being experienced, and the reports which come from engineers afloat in the channel, Mediterranean, and cruiser squadrons, as well as in ships in distant seas, justify the belief that time and experience are having their influence on the satisfactory working of even Belleville boilers. Several of the ships fitted with alternative systems of boiler have been tried this year, one battleship and a second-class cruiser having the Babcock & Wilcox boiler, while two armored cruisers and a sloop have the Niclausse type, and these on their trial gave good results. A lengthened experience with them and with the Durr and Yarrow boilers now being fitted in other ships will enable the admiralty to arrive eventually at the type which is most suitable. The most interesting series of trials were those connected with the County class of cruisers—vessels of 9,800 tons displacement and fitted with engines of 22,000 I. H. P. to attain 23 knots, a speed not before attempted in armored cruisers of the limited length of 440 ft. Two of those ships, the Bedford, built at Fairfield, and the Kent, built at the Portsmouth dock yard, passed through their trials in 1902. Seven more were subjected to their steam tests in 1903. Two of these, the Monmouth, built by the London &

Glasgow Co., and the Essex, built at Pembroke and engined by John Brown & Co. of Clydebank, belong to the first four ordered. The other five, tried last year, were laid down later, but are practically of the same type. These five were the Berwick, built by William Beardmore & Co., the Donegal, by the Fairfield company; the Lancaster, built at Elswick; the Cumberland, built by the London & Glasgow company; and the Suffolk, produced at the Portsmouth dock yard. The sixth vessel of this lot, the Cornwall, building at Pembroke dock yard has yet to be completed. In the following table is shown the horse power and speed (measured distance) on the three specification trials of the nine cruisers so far tried:

	First 30 hours		Second 30 hours		Three hours, full power	
	I.H.P.	Knots.	I.H.P.	Knots.	I.H.P.	Knots.
Bedford	4,522	14.9	16,005	21.3	22,457	22.7
Kent	4,632	14.7	16,209	20.4	22,249	21.7
Monmouth	4,711	15.7	16,326	20.5	22,189	22.4
Essex	4,642	14.0	16,132	20.0	22,219	22.8
Berwick	4,671	14.6	16,622	21.6	22,681	23.6
Donegal	4,678	14.7	16,350	22.4	22,173	23.6
Cumberland	4,930	15.4	16,472	22.2	22,784	23.7
Lancaster	4,643	13.4	16,044	22.0	22,881	24.0
Suffolk	4,954	14.4	16,350	21.2	22,645	24.0

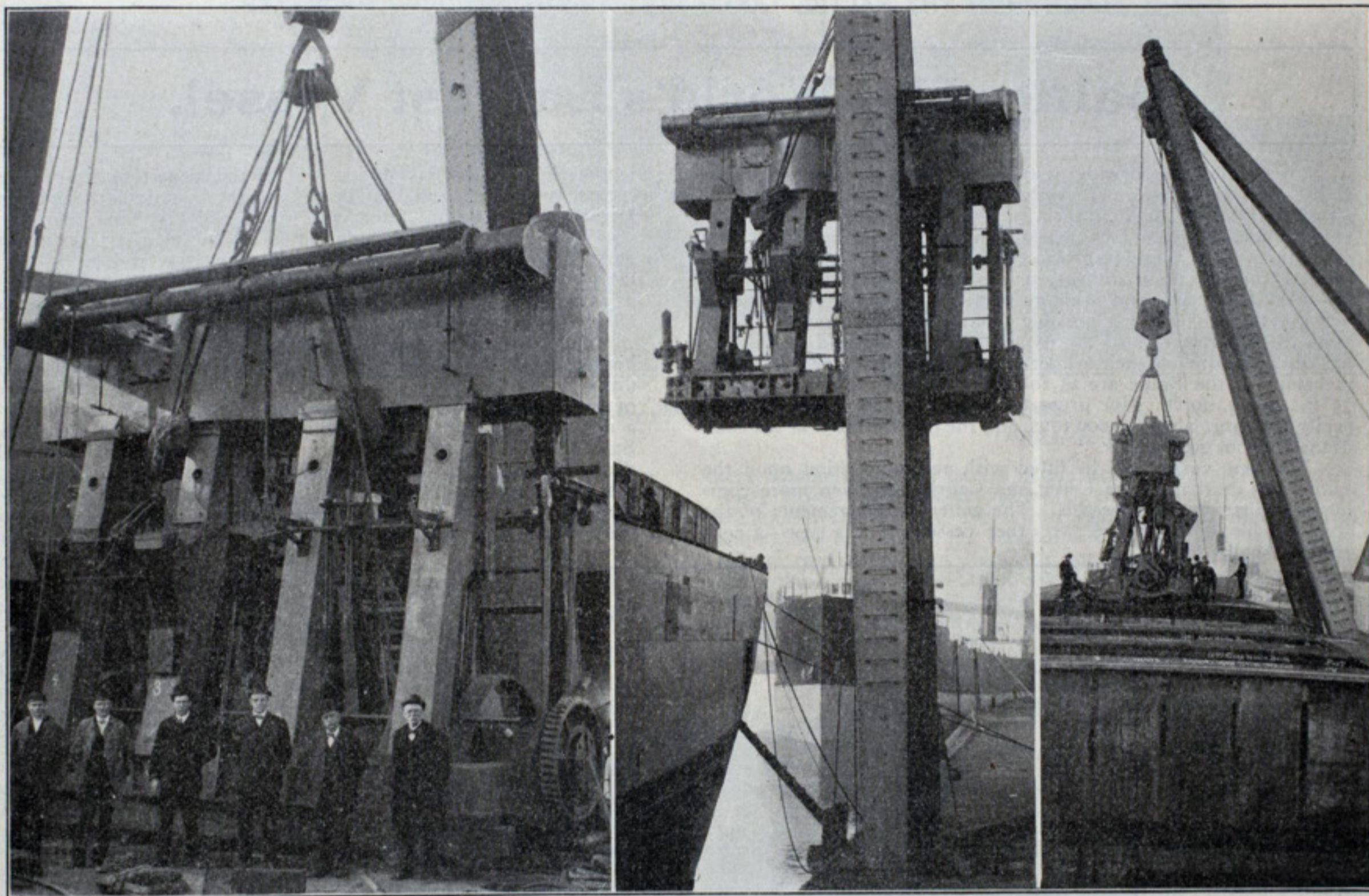
With the exception of the two last on the list the power varied very little during the first 30-hours' trial, but there are considerable differences in the speed obtained. In the results of the

BIDS FOR BATTLESHIPS IDAHO AND MISSISSIPPI.

Bids have been opened by the navy department for the construction of two 13,000-ton battleships Mississippi and Idaho. The maximum time allowed for the completion of the vessels is forty-two months and no bid will be considered which proposes to exceed that limit. The general dimensions and features of the vessels are as follows: Length on load water line, 375 ft.; breadth extreme at load water line, 77 ft.; mean draught, 24 ft. 8 in.; displacement, 13,000 tons; speed, 17 knots. The engines will be of the vertical, twin-screw, triple-expansion type of an indicated horse power of 10,000. Steam will be generated by eight water-tube boilers placed in four watertight compartments. The armament of the vessels will include a main battery of four 12-in. breech-loading rifles, eight 8-in. breech-loading rifles, eight 7-in. breech-loading rifles, and two 18-in. submerged torpedo tubes; and a secondary battery of twelve 3-in. 14-pounder rapid-fire guns, six 3-pounder semi-automatic guns, two 1-pounder rapid-fire guns, two 3-in. field pieces, two machine guns of .30 caliber, and six automatic guns of .30 caliber. It is practically assured that Cramps will get the contracts for both battleships at \$2,999,550 each. Other bidders were the Newport News Co., the Maryland Steel Co., the Fore River Co. and the New York Ship Building Co.

HOISTING ENGINES INTO A SHIP.

A common practice at the works of the Chicago Ship Building Co. is to hoist bodily into a modern lake freighter the propelling machinery by means of the 100-ton shear legs at the yard, as shown in the illustrations accompanying this article. Triple



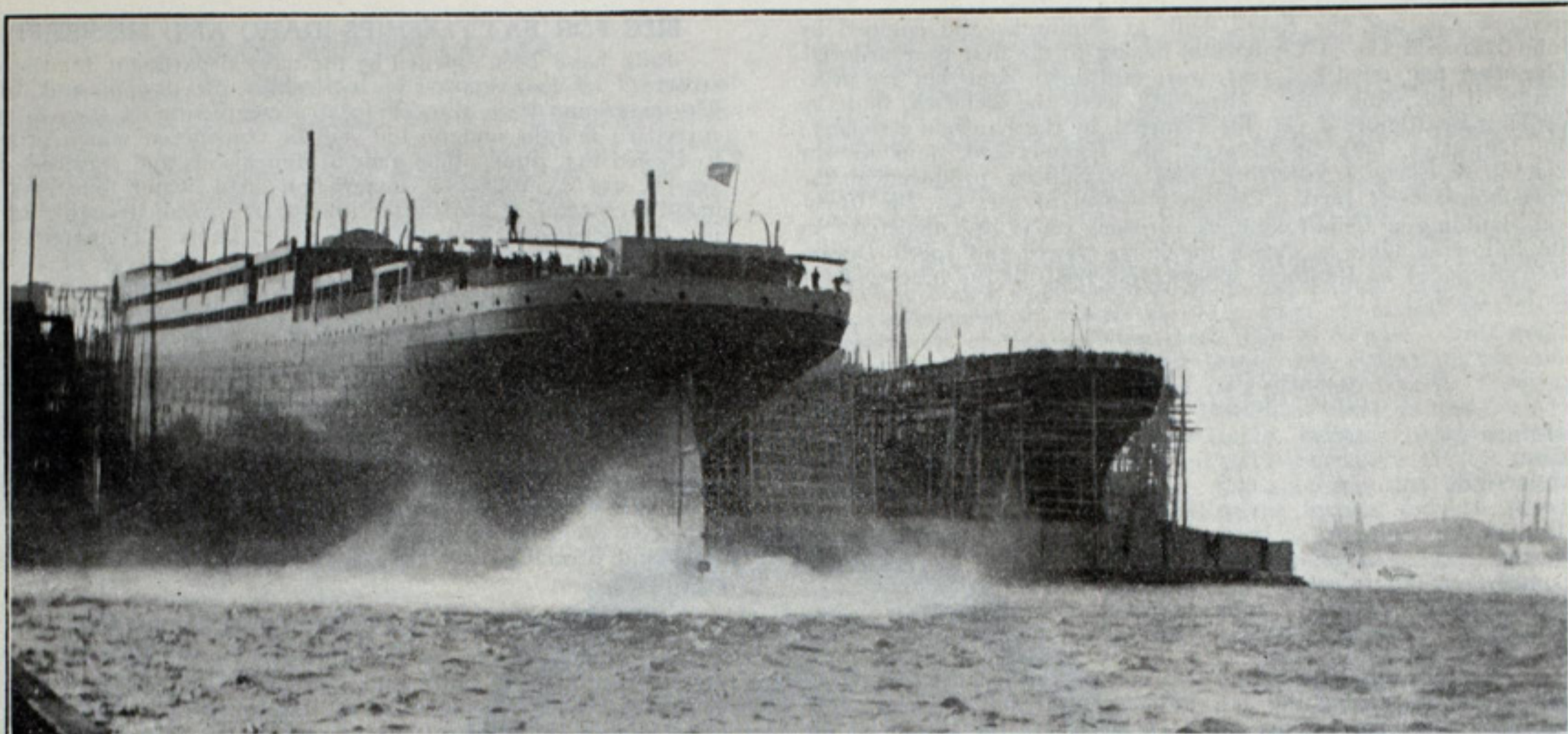
HOISTING ENGINES INTO A LAKE FREIGHTER.

second 30-hours' trial there are accurate records of speed over a known distance in deep water, and the results are more reliable. The five ships forming the second series, beginning with the Berwick, attained a higher speed for the same power than the four ships belonging to the first group, ending with the Essex. The gain in speed for about 16,000 H. P. is from 1 to 1 1/4 miles per hour. This is the result of a change in propellers. The earlier ships had screws 16 ft. in diameter with a surface of 54 sq. ft.; the latter ships had propellers 3 in. less in diameter, but with 50 per cent. more surface. Experience has been utilized in successive ships with regard to the pitch of the blades. A speed of 22 knots for 16,000 H. P. in these vessels is a very good result, and indicates that the models have been so designed as to reduce resistance to a minimum. On the full-power trial the same progressive improvement is recorded. As compared with the four earlier ships the five later ships indicate an increase in speed of about 1 mile per hour over that got with the earlier ships for the same power.

Stockholders of the company owning the lake steamer America have given the management of the vessel to Capt. J. G. Keith of Chicago. She is in the smaller class of steel propellers.

expansion engines of the steamer Robert L. Ireland, owned by the Gilchrist Transportation Co. of Cleveland, and quadruple expansion engines of the steamer Duluth, owned by the Western Transit Co. of Buffalo, have been installed in this way at the Chicago yard within the past year. The Ireland's engines weighed approximately 70 tons, and the whole operation from the time the strain was taken in lifting until the engine was landed in place in the boat, occupied only 18 minutes. The quadruple engines of the Duluth weighed 94 tons. The Review is indebted to Mr. A. G. Smith, general superintendent of the Chicago works, for the photographs from which the illustrations were made.

Conferences have this week been held between President Livingstone of the Lake Carriers' association and Mr. J. C. Gilchrist which make it practically certain that the Gilchrist fleet will be enrolled among the tonnage in the association. Mr. Gilchrist believes that much good can be accomplished by the association if its ranks are solid and he has as much as said that he desires to be enrolled. Mr. G. A. Tomlinson of Duluth announced last week that he would join if Mr. Gilchrist did. With these two fleets added the Lake Carriers' association would have an enrollment of over 1,000,000 tons.



LAUNCH OF THE BALTIC, TAKEN JUST AS SHE STRUCK THE WATER.

[Built by Harland & Wolff, Belfast, Ireland]

Baltic, The World's Largest Vessel.

The Review has already described in part the great steamship Baltic, the largest steamer ever constructed, but it has been favored with special photographs by Ismay, Imrie & Co. of Liverpool, and, therefore, takes pleasure in recasting some of its previous data. The photographs, which are striking, very clearly illustrate the enormous dimensions of this ocean leviathan. The Baltic is the largest, and in many respects, the finest vessel afloat, her great size making it possible to add improvements even beyond the other vessels of this type in which the ship builder's art has already attained such a high standard of excellence. The dimensions of the Baltic are as follows: Length, 725 ft.; breadth, 75 ft.; depth, 49 ft. Her gross tonnage is nearly 24,000, her capacity for cargo about 28,000 tons, and the displacement at her load draught about 40,000 tons.

The new vessel will be fitted with accommodation upon the same lines as that in the Celtic and Cedric, but even more commodious than in those vessels. The general arrangements of the ship will be similar to the two other vessels of this type—a continuous shade deck running fore and aft, with three tiers of deck houses and two promenade decks above same. On the upper promenade deck will be the first-class smokers room and library, and the two houses below will contain the deck staterooms—the arrangement so much admired in the Celtic and Cedric. The first-class dining saloon will be on the upper deck, and all the first-class accommodation amidships. Immediately abaft the first-class will be the second-class accommodation, and there will be also a comfortable smoke room and library for this class of passengers. The third-class passengers will be provided for abaft the second-class, and to a limited extent at the fore end of the vessel. A great

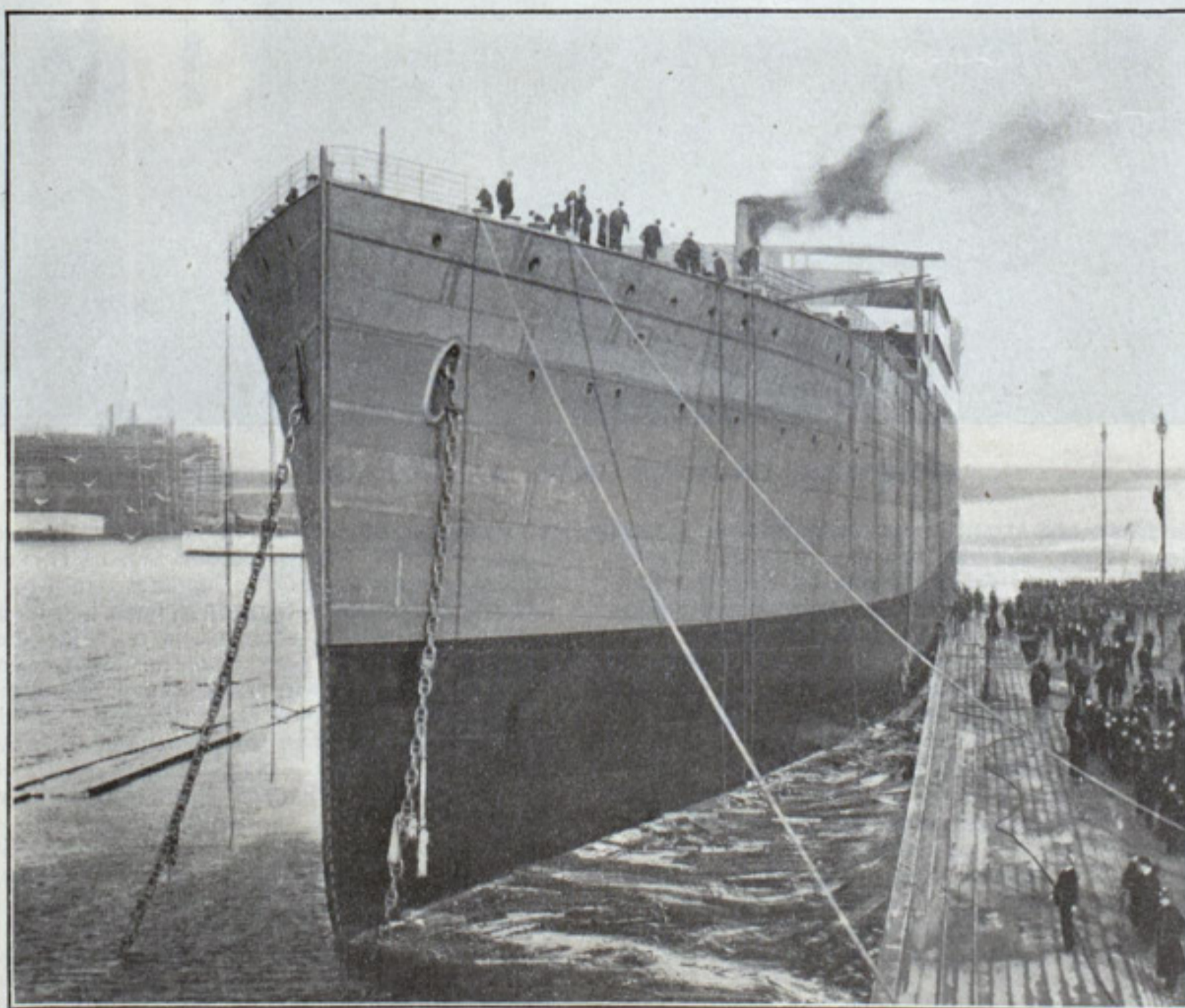
feature in this accommodation will be the large number of state-rooms, two, three, and four berth, and the commodious and comfortable dining rooms, fitted with tables and revolving chairs.

There will be accommodation in all for nearly 3,000 passengers, besides quarters for a crew of about 350, and, as is customary in the White Star steamers, no pains will be spared in providing for the convenience and comfort of the passengers of all classes, and for their safety.

The decorations will be of the most striking and artistic kind, and all the appointments handsome and luxurious. In addition to the ordinary staterooms, there will be suites consisting of bed, sitting, and bath rooms; also single berth staterooms—a new feature, in the introduction of which, as usual, the White Star Line is well to the front. Then, the exceptional and well-distributed strength of the structure of the vessel, in addition to the watertight subdivision, have secured the maximum of safety obtainable. As in the other large steamers of this type, one of the most notable features in the Baltic will be the grand dining

saloon—a very handsome apartment. Situated on the upper deck, it will extend the full width of the ship, 75 ft. It will be exceptionally lofty and airy, and will contain seating accommodation for 370 people. With its domed skylight and artistic and effective decoration, this will be one of the most magnificent and comfortable dining saloons on the Atlantic. The first-class smokers room and library will also be magnificent apartments, and the second-class public rooms will be alike elegant and comfortable.

The heating and ventilation arrangements of the ship will be most complete, and the Baltic, having such large cargo capacity, will be fitted with winches and other loading and discharging arrangements of the



THE BALTIC MOORED AFTER LAUNCHING.

[Built by Harland & Wolff Belfast Ireland]

latest and most efficient type. There will be large-refrigerating chambers for the carriage of chilled beef, the machines for working same will be on the C O₂ principle.

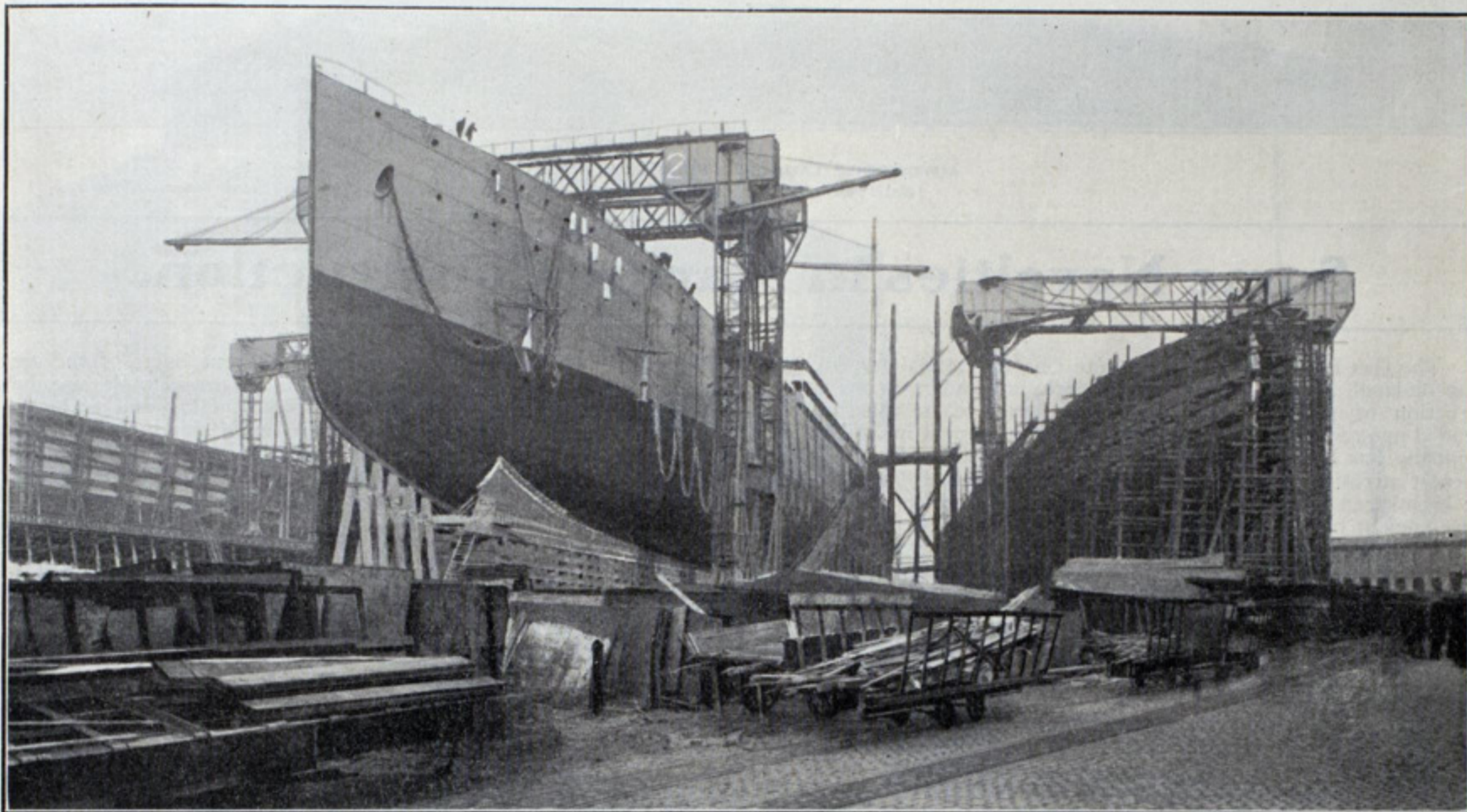
The Baltic will be fitted with engines of Harland & Wolff's quadruple-expansion type, about 13,000 I. H. P., and the speed will be about 16½ to 17 knots. The engines are arranged on the "balance" principle, which practically does away with vibration. The twin engines and twin screws afford another element of safety to the ship and passengers, and the possibility of danger is reduced to a minimum.

It is interesting to note that the tonnage of the White Star fleet now amounts to the huge total of nearly 350,000 tons. It

clined. Our registered ocean fleet in 1810 was 108,000 tons larger than it is now. A comparison of the tonnage of fleet registered for deep sea commerce of several nations shows the inexcusable weakness of our merchant marine:

United States	873,000 tons.
Italy	1,180,000 tons.
France	1,480,000 tons.
Norway	1,660,000 tons.
Germany	2,960,000 tons.
British empire	14,800,000 tons.

"The United States has developed the most marvelous for-



THE BALTIC ON THE STOCKS, JUST PRIOR TO HER LAUNCHING.

[Built by Harland & Wolff, Belfast, Ireland.]

consists of twenty-nine steamers, of which twenty-five are fitted with twin screws, and possesses no fewer than twenty-one vessels of over 10,000 tons each, including three of over 20,000, one of 17,000, and two over 15,000 tons.

THE WEST IS FOR SHIPS.

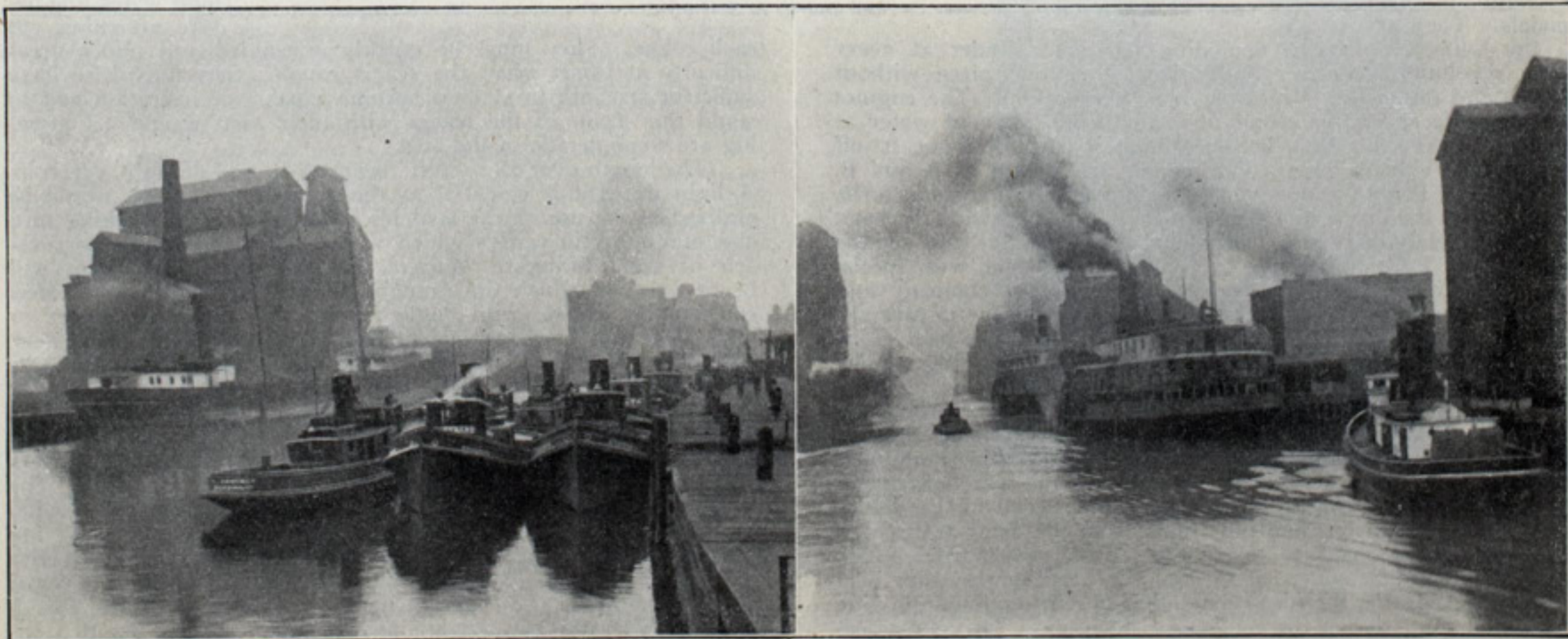
Following is the report of the legislative committee of the Commercial Club of Topeka, Kas., as submitted recently through the chairman of the committee, Mr. James A. Troutman:

"Your committee on state and national legislation, to whom was referred the correspondence of the New York Board of Trade and Transportation relative to the restoration of the American merchant marine, instruct me to submit the following report:

"An investigation shows that our merchant marine instead of keeping pace with our commercial development, has actually de-

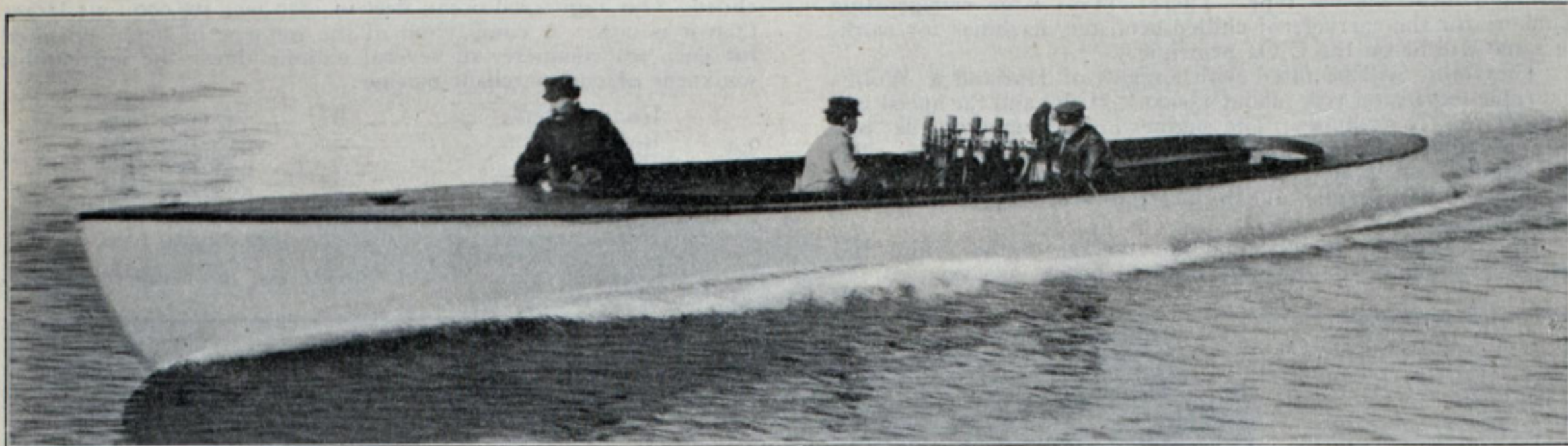
eign commerce of any nation in the world. We are sending into other lands nearly \$5,000,000 worth of American products and commodities every day, but it is a significant fact that American ships carry less than 9 per cent. of our exports and imports. The tribute paid to foreign ships for conveying merchandise to and from the United States amounted to over \$100,000,000 last year. Our country is foremost in nearly all lines of industrial and commercial development, but it is lagging behind even the smaller foreign nations in its merchant marine. The patriotic pride and the commercial instinct of our people suggest the improvement of our fleet commensurate with our commercial needs.

"Without committing ourselves to any definite plan, we urge upon congress the commercial necessity of prompt and decisive action to the end that all American commerce may be carried in American vessels. A patriotic and self-reliant people will be satisfied with nothing less than this."



TWO INTERESTING PHOTOGRAPHS OF BUFFALO HARBOR.

[Fred J. Debus, Buffalo, N. Y.]



AUTOMOBILE LAUNCH, SPEED 20.6 MILES.

[Built by Gas Engine & Power Co. and Charles L. Seabury & Co Consolidated, Morris Heights, N. Y.]

Some Novelties in Marine Construction.

The Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York, are leaders in the construction of pleasure craft and may, therefore, be usually depended upon for innovations. The latest development in which the company has been especially successful, and which has won the keenest attention of naval architects, is the so-called "auto boat," or high-speed launch with gasoline power. It marks a decided development of speed with small craft and seems to be coming into general favor. At any rate it permits one to tear through the water at a terrific rate for a moderate original expenditure and a modest one for maintenance. These craft are to the water what the automobile is to the land. There is no particularly distinguishing feature of the hull, which is built very light, comparatively narrow, and usually on the model of the torpedo boat, with flat stern. The particular one illustrated in this issue is 40 ft. long, 5 ft. beam, and has a draught of about 9 in. She is single-planked with cedar and built without keel. Butternut was used in finishing the cockpit.

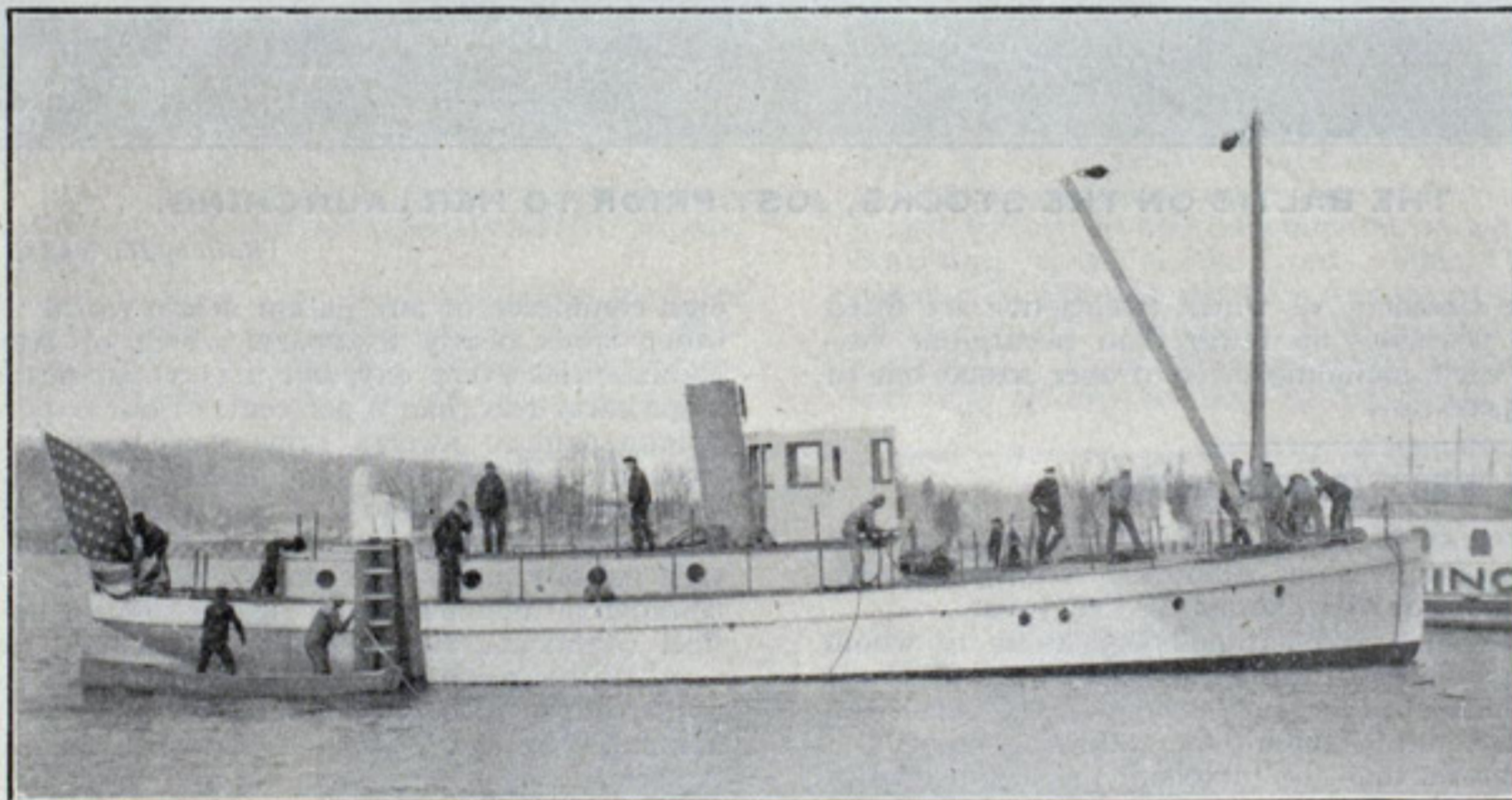
The greatest interest centers in the engines. They are built of minimum weight and driven much faster than in regular service, making from 600 to 900 revolutions per minute. The engine is known as the Round-trip (very significant and excellent name for an automobile boat) and is built in two models. They are

of the four-cycle pattern exploding in each cylinder at every other revolution. Each cylinder is cast in one piece without flanges and the piston is inserted from the bottom. The engines have a perfected water circulation, admitting the cold water at the top where the heat becomes highest and draining it off through the exhaust pipe. The models are known as A and B. In the model B the frame is one of the built-up or stanchion form, while in the smaller engines, or model A, it is cast with the base. In the model B there is a mechanical exhaust valve and suction inlet valve. Ignition is made by jump-spark system, with special plug, commutator and vibrator, designed by the company and made for this particular line of work. The propeller is reversed by the planetary gear clutch connected with the motor bed. This launch is said to have attained a speed of 20.6 miles, using a 22-in. wheel at 900 revolutions.

The company has also lately constructed a sectional boat for the army department, which is, in its way, a decided novelty. This vessel has just been launched and is named the Pontonier. It was built to meet a necessity confronting the war department in the Philippines. Improved facilities were needed for the handling of men, provisions and munitions from the army transports. A tender which could be taken aboard and transported bodily would have insufficient capacity, and the need for a larger boat was responsible for the idea of building one in sections—proving again that necessity is the mother of invention. Of course sectional craft are common and there would be nothing worth while in this one were it merely a sectional boat. Certain new features

had to be introduced in this craft. Numerous boats of the sectional type have been constructed, some of considerable size, but with the intention of providing for one handling and to be assembled where the facilities of ship yards and ship builders would be available. There are no such facilities in the Philippines and moreover the war department wanted a boat that could be put into commission on short notice and wherever the transport happened to be. These conditions necessitated further development of the sectional boat to make it practical of assembling with the members afloat or when put overboard separately by the ship's derrick. The war department issued a call for bids, stipulating the requirements and leaving it with the bidders or builders to make their own plans and specifications and to rely on their own ingenuity to fulfill the contract. The proposal of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, was

accepted. The boat has been constructed accordingly and with every evidence of her complete success. At first thought the problem would not seem difficult but with deeper study of the technical features a number of perplexities develop. The different members or sections, with their varying size and weight, and the weight of the equipment they carry, must naturally have different displacement when put afloat and be brought to a common water line before attaching to



PONTONIER AFTER SECTIONS HAVE BEEN JOINED.

[Built by the Gas Engine & Power Co., and Charles L. Seabury & Co Consolidated, Morris Heights, N. Y.]

each other. They must be quickly assembled and under great difficulty at times when the sea is rough; they must also have sufficient strength to at once become capable of operation and to stand the strain of the waves with their own weight. Following are some details of the boat:

The length over all is 80 ft., beam 18 ft. and draught 3 ft. 6 in. A light draught is essential as the greatest advantage would be realized in the use of the boat for embarking and debarking men and munitions in waters which would not be navigable for vessels of great draught. With a full load the displacement will be 72 tons, on which the draught is calculated. She is of steel construction entire, with angle frames and stringers, girder or plate keel and keelsons inside, and plating of $\frac{1}{4}$ in. ship steel, with lapjoints. With the steel deck each member becomes water tight or box-like in form. The bow section is comparatively short, carrying derrick and the anchor equipment, with chain and store-lockers inside. The quarter section, or that next the bow section, serves both as a hold for cargo and as quarters for the crew. In fact it will berth twenty men if required. The third section carries the boilers, the coal bunkers and a portion of the water storage. The coal capacity will be 13 tons, giving a liberal running radius. On the top of this third section is also fitted a pilot house, portable, with or without which the vessel may be operated. The section next aft the boiler, or the fourth section, will carry the driving power intact, that is the two engines (for she will have two), their shafts and the propellers, thus keeping them in perfect alignment and without danger of

being disturbed. A portion of this section, measuring 11 ft. 6 in. fore and aft, is cut off with an inside bulkhead to give quarters for the officers. The boiler is one of the Seabury water-tube pattern, and the engines are compound, measuring 6 and 12 in. and having piston stroke of 9 in., capable of giving her a speed of 10 miles per hour. The fifth section composes the oval counter, which may or may not be used. As this section comes above the waterline its omission gives the vessel a square stern effect.

When putting the vessel in commission the boiler section will

ANNUAL MEETINGS OF MASTERS AND ENGINEERS.

During the present week the Marine Engineers' Beneficial association and the American Association of Masters & Pilots have been in session in Washington. Officers of the Masters and Pilots' association say that a most satisfactory condition exists and that whatever trouble may have been between masters and owners on the great lakes has now totally disappeared. President Silva said that affairs were more encouraging than



SHOWING THE PONTONIER IN THE WATER BEFORE THE SECTIONS ARE JOINED TOGETHER.

[Built by the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, N. Y.]

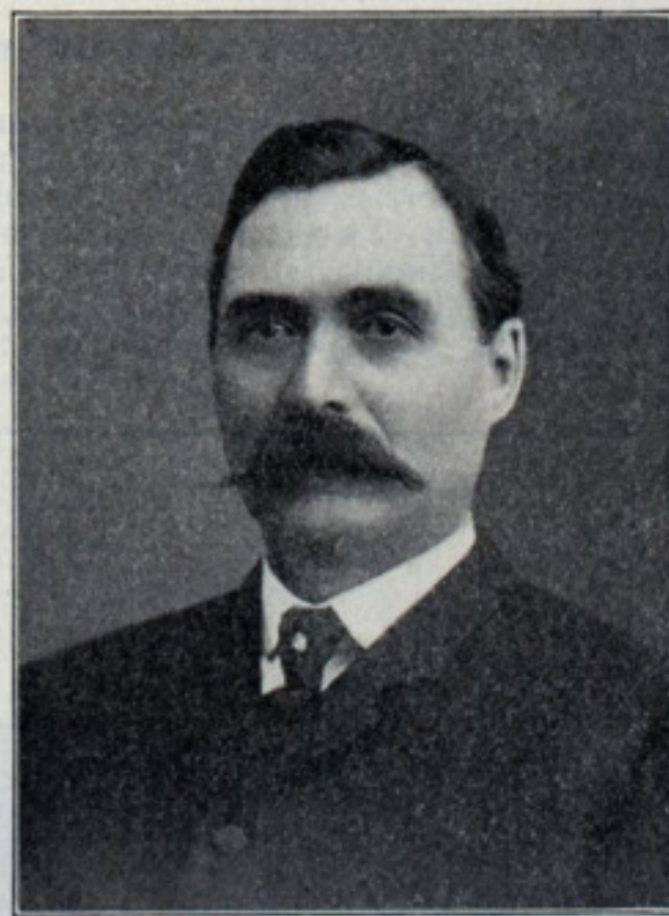
first be floated, having the greatest weight, establishing the water-line, and the others may follow in order, working either fore or aft. They are fitted with sea valves and sea water is admitted into their bottom until they reach the common water line. Two sections coming together have their ends fitted with four cones of about 14 in. diameter, one set pointing inward, the opposite pointing outward. On the deck of each section is fitted a small windlass with a steel cable which works on a differential system. The cable connects the cones of one section to the other, and the windlass being operated brings the four cones together, one from each section engaging that of the one adjoining. When all have been secured, the water ballast is removed by steam syphon connection, and they are reinforced by connecting bolts, one section to the other. The boat is then ready for use as soon as the steam connection between the engine and boiler sections can be coupled and the piping for the water feed to boiler connected to the pumps. When required to be taken apart for reloading on transport the operation is simple, involving only the breaking of the steam pipe connection, removal of bulkhead stay bolts and relaxing of the cables holding the cones to disengage them.

The contract provides that a demonstration shall be made prior to acceptance to prove the practicability of the scheme, and after this has been given official attention the vessel will be sent to Washington where she will be used temporarily for drilling until assigned to one of the transports.

On the opening of lake navigation in 1904, a fixed red light of the fourth order, illuminating the entire horizon, will be established in the white, conical, brick tower, surmounted by a black lantern, recently erected at Crisps point, on the southerly shore of the southeasterly end of Lake Superior, about 14½ miles to the westward of Whitefish point. The focal plane of the light will be 62 ft. above lake level, and 52 ft. above the base of the structure, and the light will be visible 15½ miles in clear weather, the eye of the observer 15 ft. above the lake. On the same date there will be established at the station a 10-in. steam whistle, to sound, during thick or foggy weather, blasts of 4 seconds' and 3 seconds' duration, separated by silent intervals of 10 seconds and 30 seconds, thus: Blast 4 seconds, silent interval, 10 seconds; blast 3 seconds, silent interval, 10 seconds; blast 3 seconds; silent interval, 30 seconds.

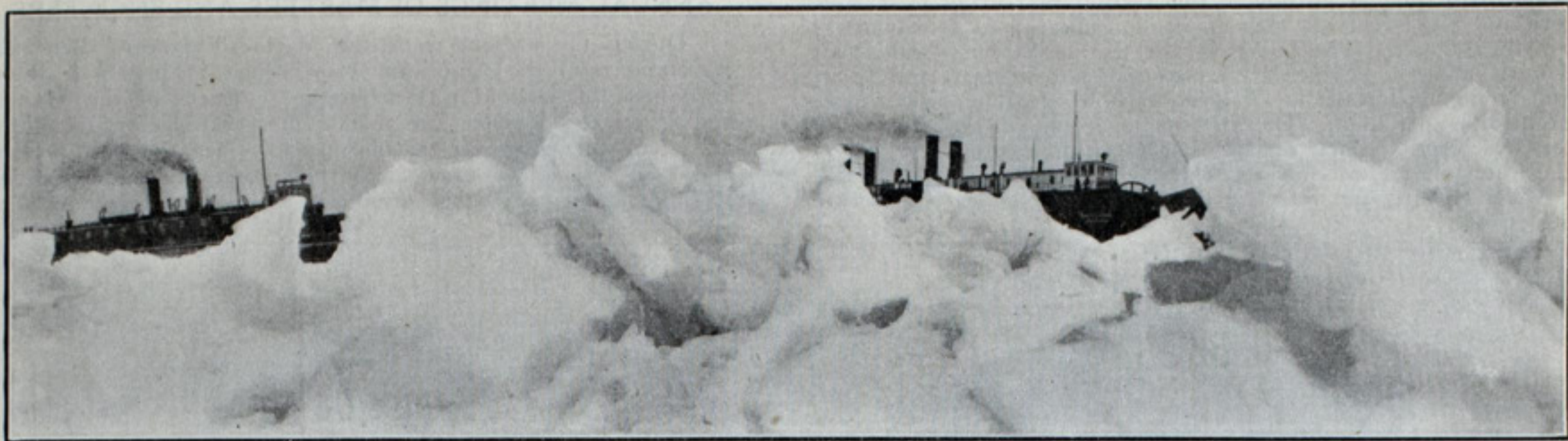
they ever had been in the eighteen years' history of the association. From the great lakes particularly and also in almost equal measure from the other departments had come reports of entire accordance between owner and master, which, he said, had resulted in the large development of industry for which the association stands.

The marine engineers elected the following officers: Presi-



MR. EVAN I. JENKINS.

dent, Frank A. Jones, San Francisco; first vice-president, William Bray, Norfolk; second vice-president, Evans I. Jenkins, Cleveland; treasurer, Albert L. Jones, Detroit; advisory board, W. J. Dubois, New York; William Shaffer, Baltimore; Joseph Brook, Philadelphia.



PHIC PHOTOGRAPH OF WHAT THE CAR FERRIES SAINTE MARIE AND ST. IGNACE HAVE TO CONTEND WITH.

Great Lakes Ice-Crushing Car Ferries.

Navigation on the great lakes is original and unique. Nowhere in the world is there anything to compare with it. The steamers that navigate it and the freight that is carried across its surface are both distinctive. Owing to the fact that freight is principally in bulk—that is iron ore, coal or grain—the hold of the steamer is one continuous compartment, with anywhere

from fourteen to twenty-four hatches, all leading into this common hold. There could be nothing simpler than this—the result is a very capacious beast of burden with no pretense to beauty. The lake steamer may be a joy forever to its owner from the money making standpoint but it certainly is not a thing of beauty. So much for navigation when the lake is open. The great lakes, however, are frozen for four months out of the twelve, but severe winter weather, while it sends the ordinary freighter to the docks, does not put a quietus upon lake navigation altogether. There is a type of craft in the service of the great railways which must continue to run whether the lakes be frozen or no. These are the ice crushers, commonly known as car ferries, and it is with this special type that this article has to deal. Two men are principally responsible for the creation of these singular steamers—Mr. Frank E. Kirby of the Detroit Ship Building Co. and Mr. Robert Logan of the American Ship Building Co. What conditions these steamers

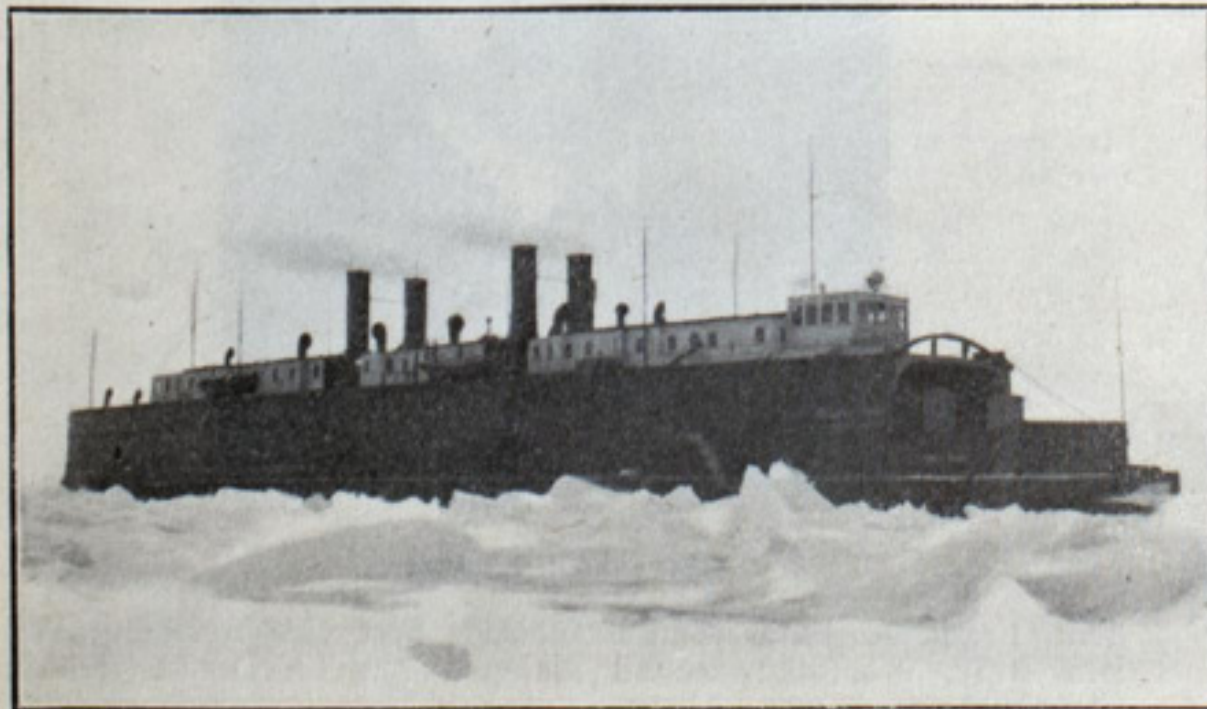


SAINTE MARIE IN THE ICE IN THE STRAITS OF MACKINAC.

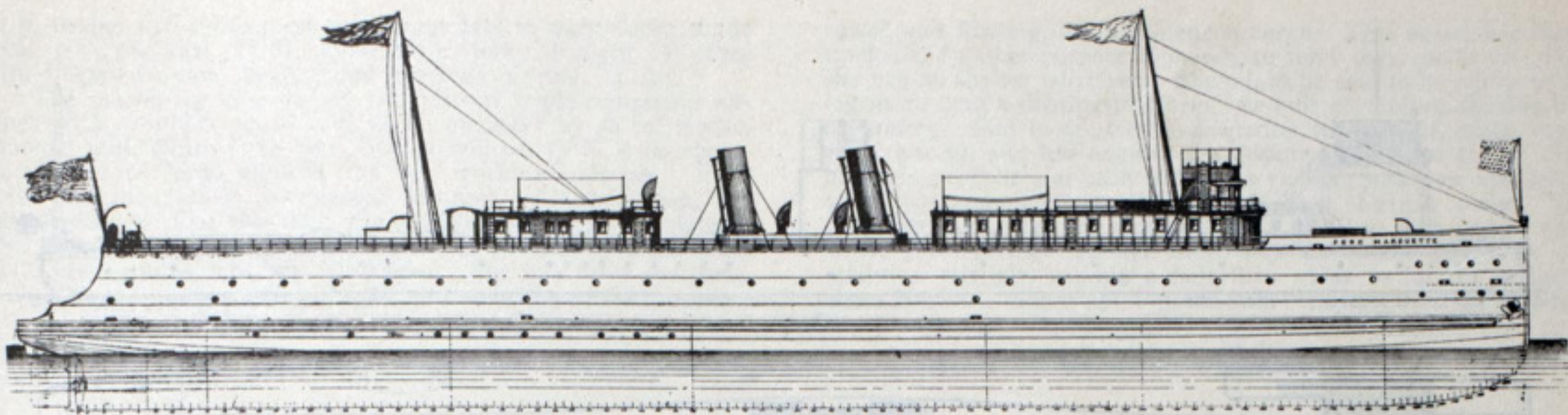
have to face can best be conveyed by reference to the photographs which accompany this article, showing the vessels successfully combating with field, drift and windrowed ice. Since these vessels went into service no winter has been severe enough to check them, nor have any conditions of ice been met with that they could not work their way through.

Probably the two best known ice crushers in the world are the St. Ignace and Sainte Marie, which were designed by Mr. Frank E. Kirby and built by the Detroit Dry Dock Co. for summer and winter navigation in the Straits of Mackinac for the Duluth, South Shore & Atlantic, the Michigan Central and Grand Rapids & Indiana railroads, to make the connecting link between the lower and upper peninsulas of Michigan. Mackinaw City in the lower peninsula and St. Ignace in the upper peninsula are the termini and the distance traversed is 8 miles. For massive construction these vessels (they

are of wood) have no equals. The frames are 24 in. wide and 12 in. thick. There are fifteen keelsons, none less than 14 in. square. Extra frames make almost a solid shell of frames at the turn of the bilge where there are two extra keelsons 24 in. square. The planking is 6 in. thick and the hull is nearly 3 ft. thick on the bottom. The water line on the sides is protected by half-inch steel plates. The bow and stern are protected by 2-in. steel plates.



SAINTE MARIE AND ST. IGNACE IN THEIR WINTER TRADE.



OUTBOARD VIEW OF CAR FERRY PERE MARQUETTE NO. 20.

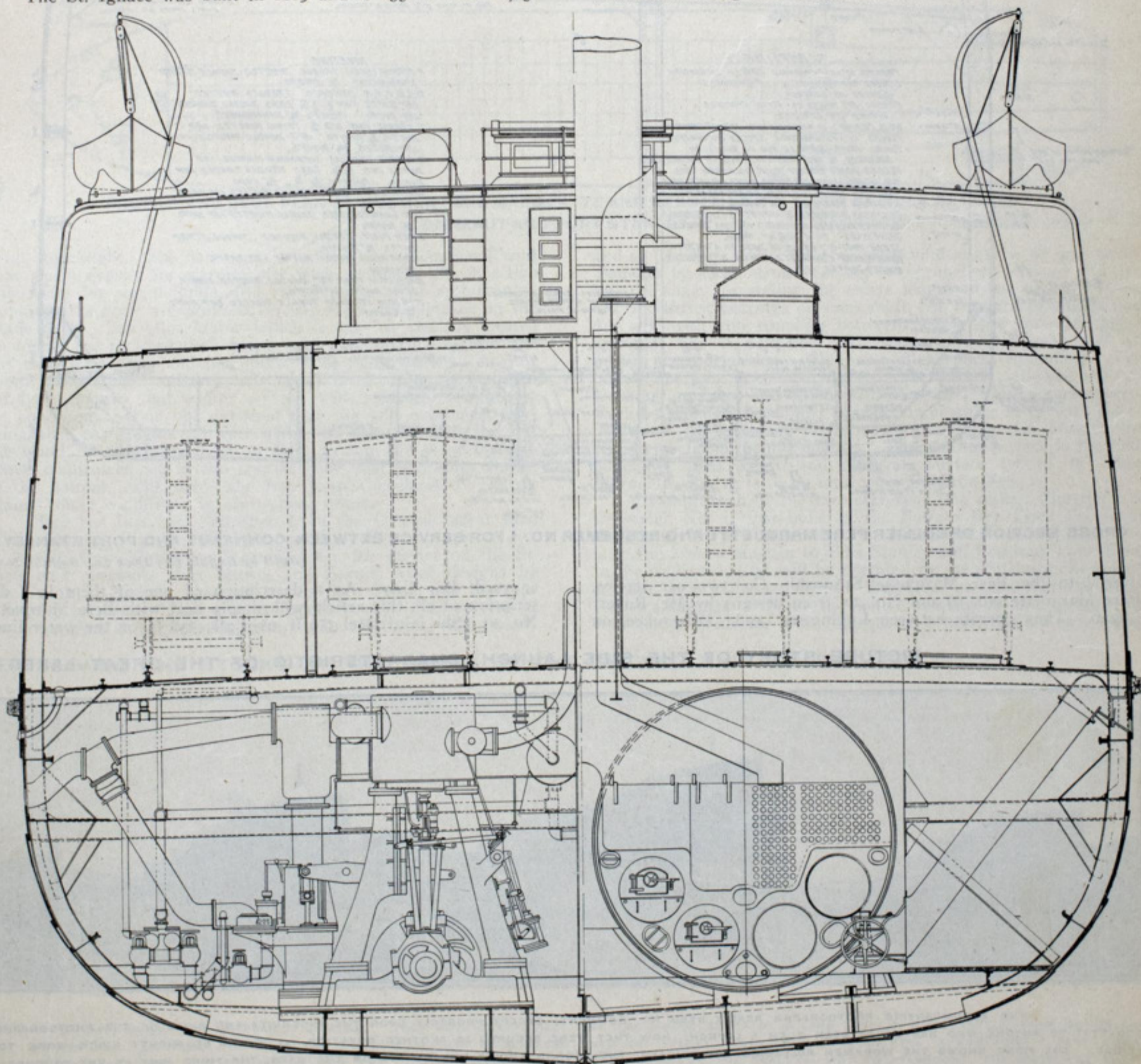
[Built by American Ship Building Co., Cleveland.]

These car ferries have a bow and stern wheel. The bow wheel is used only in the winter to displace the ice from the bows of the boat, especially in heavy windrowed ice fields, which are often 25 or 30 ft. below the surface of the water. The St. Ignace was the first ice crusher in the world to be fitted with a forward wheel for ice purposes. The idea was original with Mr. Kirby, who believed that by displacing the water with a forward screw it would dislodge the ice and enable the vessel to crush it more readily. It proved a great success in every way, which led Mr. Kirby to install it in the Sainte Marie when he built this powerful crusher a few years later. It also led to inquiries from all over the world, and especially from the Russian government, which has to deal with severe ice conditions in the Baltic. When the Russian ice crusher Ermack was built for Baltic service she was fitted with a forward screw after Mr. Kirby's design.

The St. Ignace was built in 1889 and is 235 ft. over all, 52

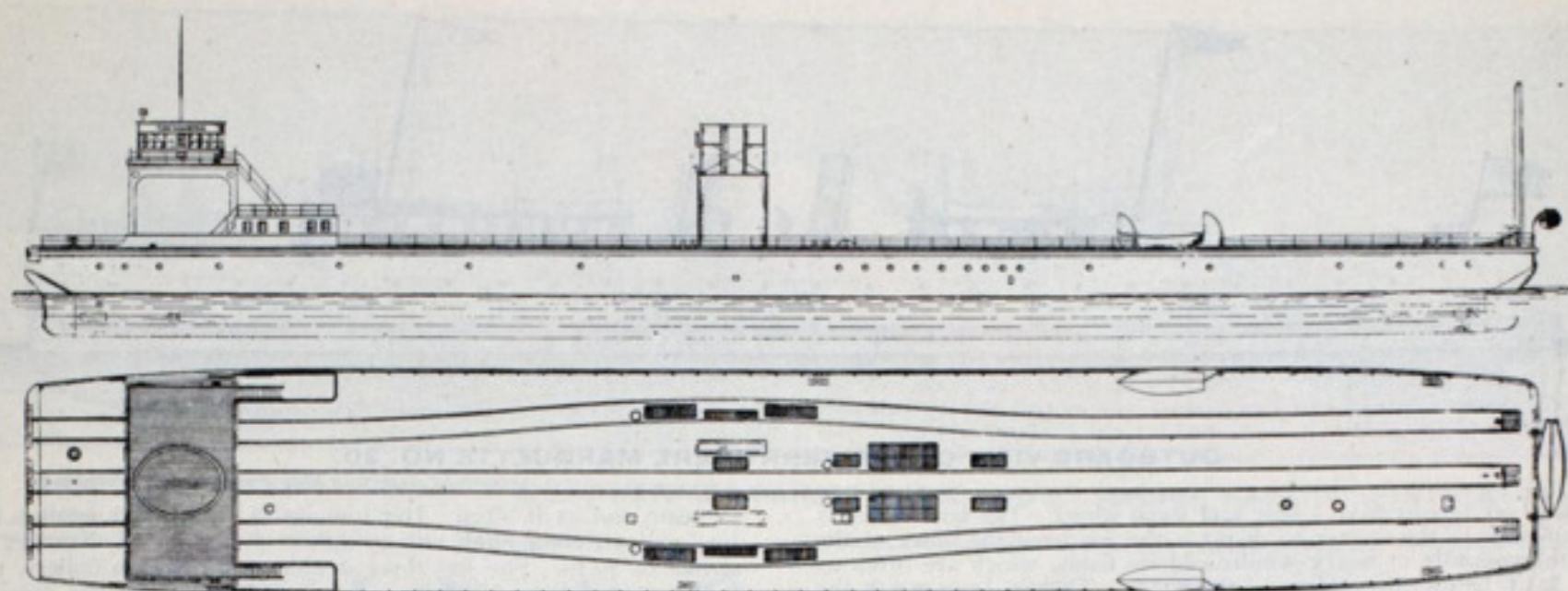
ft. beam and 25 ft. deep. Her tonnage is 1,199. Her engines are fore and aft compound with cylinders 28 and 52 in. diameter by stroke of 40 in. She has three double-ended Scotch boilers, 11.6 ft. by 18 ft., allowed 120 lbs. pressure. The size of her forward wheel is 10 ft. She carries ten freight cars and her speed is 15 miles an hour.

The Sainte Marie was built in 1893 and is 305 ft. over all, 53 ft. beam and 25 ft. deep. Her tonnage is 1,357. Her hull is of wood, sheathed with steel. Her after engines are compound, with cylinders 32 and 58 in. diameter by stroke of 48 in.; her forward engines are also compound with cylinders 28 and 52 in. diameter by stroke of 40 in. Her forward wheel is 10.6 ft. and her after wheel 12 ft., making 100 revolutions. She has four double-ended Scotch boilers, with cylinders 11 ft. 6 in. by 18 ft. The Sainte Marie carries eighteen freight cars and has a speed of 16 miles



CROSS SECTION OF CAR FERRY PERE MARQUETTE NO. 20.

[Built by American Ship Building Co., Cleveland.]



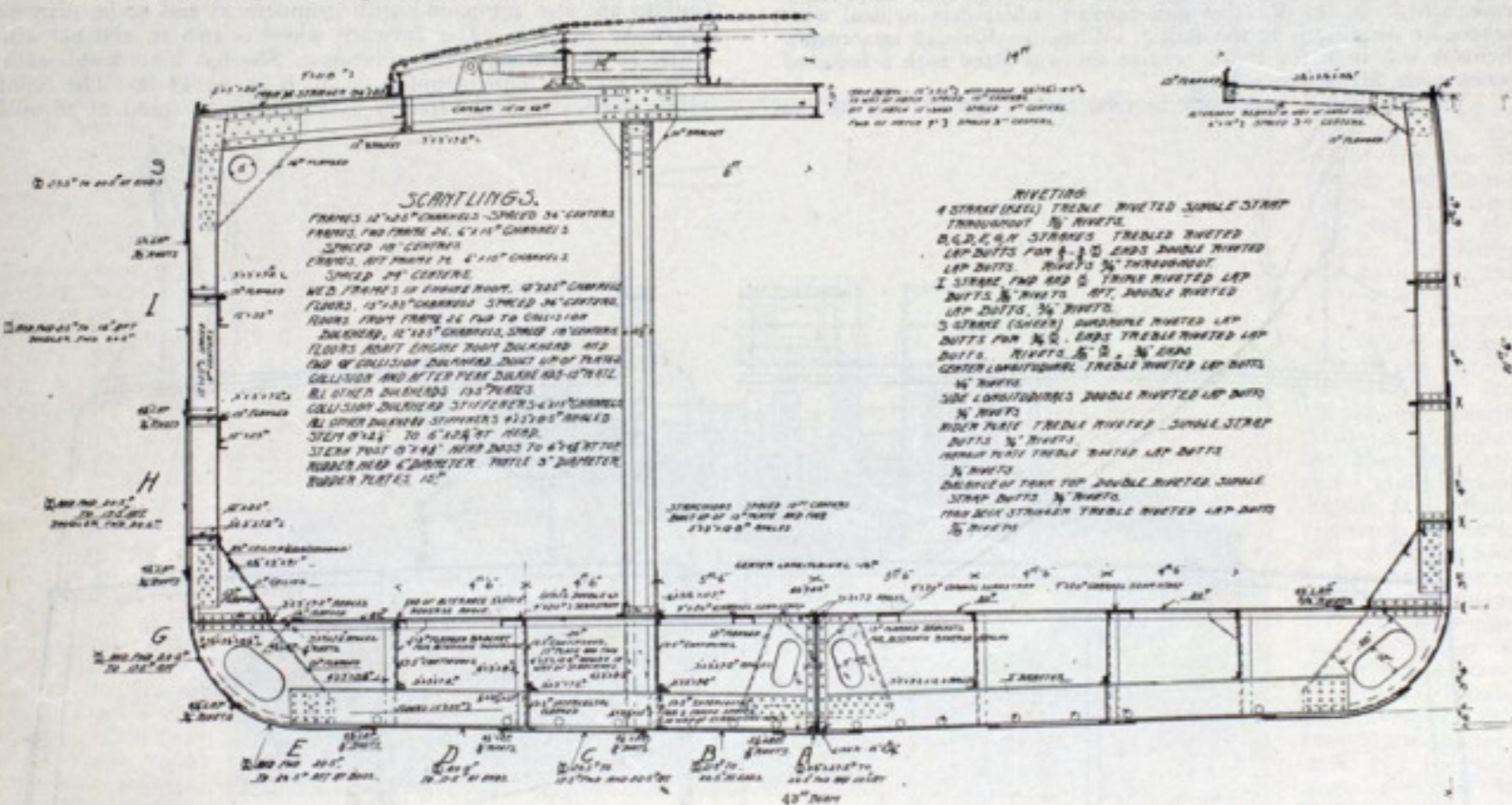
PROFILE AND DECK PLANS OF CAR FERRY PERE MARQUETTE NO. 14, FOR SERVICE BETWEEN PORT HURON AND SARNIA.

[Built by Detroit Ship Building Co., Detroit, Mich.]

per hour. The record of these two vessels as ice crushers in the straits of Mackinac is simply wonderful.

The American Ship Building Co. at Cleveland has just de-

Lake Michigan, and make five vessels in all which Mr. Logan has designed for this company during the past few years, the first, Pere Marquette No. 15, having been built at the old Wheel-



CROSS SECTION OF COLLIER PERE MARQUETTE AND BESSEMER NO. 1 FOR SERVICE BETWEEN CONNEAUT AND PORT STANLEY.

[Built by Buffalo Dry Dock Co., Buffalo, N. Y.]

livered to the Pere Marquette Steamship Co. two car ferries, Pere Marquette No. 19 and No. 20, from designs by Mr. Robert Logan. They operate between Ludington and Milwaukee, on

er yard, Bay City. As a description of one of them is a description of all, this article will simply deal with Pere Marquette No. 20. She is of steel 350 ft. over all; 338 ft. on the water line;

PICTURE STORY OF THE SIDE LAUNCH, CHARACTERISTIC OF THE GREAT LAKES—A FREIGHT STEAMER LEAVING THE STOCKS AT THE WORKS OF THE CHICAGO SHIP BUILDING CO.

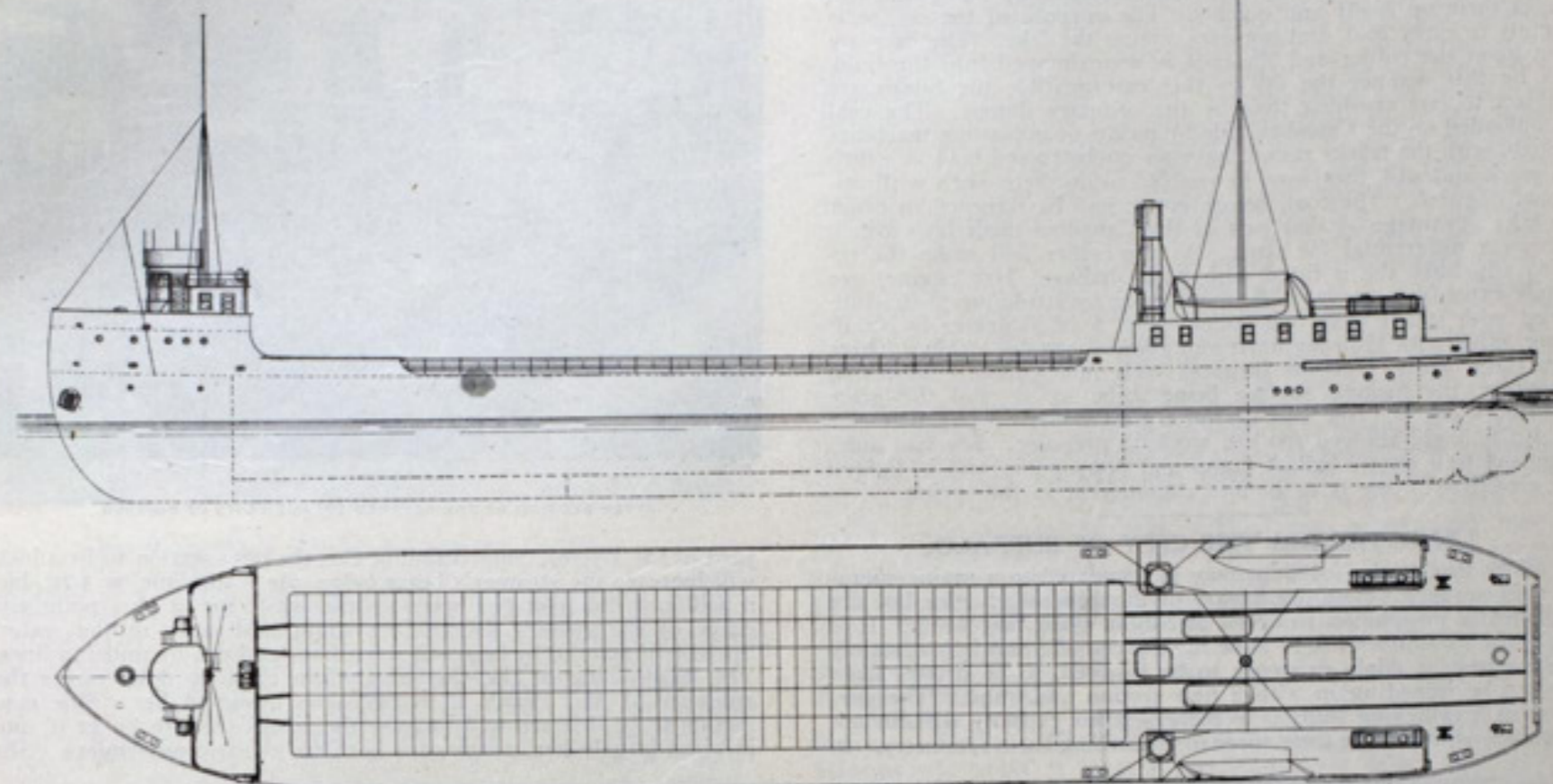


THE ACCOMPANYING PHOTOGRAPHS REALLY NEED NO COMMENT, EXCEPT PROBABLY UPON THE INGENUITY AND SKILL OF THE PHOTOGRAPHER HIMSELF. THEY ARE THE PRODUCT OF THE GIBSON ART GALLERIES, CHICAGO. THEY VERY GRAPHICALLY TELL THE WHOLE STORY OF A LAKE LAUNCH, MUCH BETTER THAN WORDS CAN CONVEY IT TO ANYONE WHO HAS NEVER SEEN SUCH A LAUNCH. HOW THEY WERE SECURED IS ANOTHER QUESTION. IT WOULD BE MIGHTY QUICK WORK TO GET THEM PERIOD. THE FIRST SHOWS THE WORKMEN RELEASING THE TRIGGER, THE SECOND SHOWS HER MOVING ON THE WAYS, THE THIRD JUST AS SHE TOUCHES THE WATER, THE FOURTH SHOWS THE COMPLETE DROP INTO THE WATER WITH THE NATURAL LIST TO PORT, THE FIFTH SHOWS THE REACTING LIST TO STARBOARD, THE SIXTH THE SLIGHT ROCK TO PORT AGAIN, AND THE SEVENTH BRINGS HER UPON AN EVEN KEEL—THE PRECISE AND VERY MOVEMENTS THAT A SIDE-LAUNCHED VESSEL MAKES. THE STEAMER IS THE MARSA, BUILT FOR THE MINNESOTA STEAMSHIP CO., NOW A PART OF THE FLEET OF THE UNITED STATES STEEL CORPORATION, OPERATED BY THE PITTSBURGH STEAMSHIP CO.

56 ft. beam; 19.6 ft. deep on sides from keel to main deck; shade deck, covering cars, 17 ft. above main deck; draught of water with thirty-two cars, loaded, and 200 tons of fuel, 14 ft.

The machinery consists of two sets of triple-compound engines with cylinders 19, 31 and 52 in. diameter by 36 in. stroke, supplied with steam from four Scotch boilers, 13 ft. 9 in. diameter by 12 ft. long, allowed 175 lbs. working pressure. Each boiler has three 42 in. corrugated furnaces. All the pumps are independent, so that the main engines are entirely self-contained. The ferry is equipped with steam steering gear, and, in addition, has Akers' patent auxiliary hand gear. She has three dynamos, is lighted throughout by electricity and is equipped with a pow-

rowed and floating, has to be encountered. This vessel has three tracks, and as her purpose is merely to ferry cars across the river she has no shelter whatever. She might be said to be really nothing more than a floating platform, her hull containing nothing but machinery. She is of steel construction throughout, made especially strong, and her engines are designed for 3,000 H. P. She has twin propellers at each end and a rudder, both bow and stern, with two complete sets of steering gear, both bow and stern, takes her cars on at the bow and has a wheel in each end of pilot house for steering. In her short trip across the river she describes a triangle, making a half turn so as to hit the opposite shore bow on. She is 351 ft. 9 in. over all, 326 ft. keel, 52 ft. beam



PROFILE AND DECK PLAN OF COLLIER PERE MARQUETTE AND BESSEMER NO. 1, FOR SERVICE BETWEEN CONNEAUT AND PORT STANLEY.

[Built by Buffalo Dry Dock Co., Buffalo, N. Y.]

erful searchlight. She has steam windlass and is equipped with four steam gypsies for warping her when at dock. She has two pole spars for signal lights, and two funnels. The accommodations for the crew are provided in two steel deck houses on the shade deck. The pilot house, which is also of steel, is located on top of the forward deck house with the captain's bridge. She has twin screws aft and her speed is 14 miles loaded. At this speed her engines indicate about 2,500 H. P. She is designed for both summer and winter service, with especial reference to ice conditions. It is not expected that she will ever meet anything that she cannot contend with. In point of fact she left Cleveland for her home port on Dec. 20 last and went through heavy windrowed ice in the Detroit river that was solid almost to the bottom. She made the trip from Cleveland to Detroit against these conditions in sixty-three hours.

There has just been launched from the Orleans street yard of the Detroit Ship Building Co. car ferry Pere Marquette No. 14 for the Pere Marquette Steamship Co. for service on the St. Clair river between Port Huron and Sarnia, after designs by Mr. Frank E. Kirby. This run is less than a mile and the conditions to be met with are unusual in every way. The current of the river here is very strong, and ice in all forms, field, wind-

and 21 ft. deep. She has two compound engines, 28 and 52 in. diameter by 36 in. stroke, driving two propellers forward and two aft, the shafts extending the entire length of the vessel. There are two thrust bearings on each shaft, one forward of engine and one aft, with slip coupling between engine and forward thrust bearing. She is equipped with steam turn-over gear and all pumps are independent. She has a Blake pump equipment. The boilers are four in number, 13 ft. 2 in. by 12 ft., allowed 150 lbs. working pressure and fitted with two 48-in. Morison furnaces. Each boiler has independent combustion chamber fitted with Howden draft, the air being furnished by two Fuller Co. blowers direct-connected to double engines. The heating surface in the four boilers is 4,584 sq. ft. and the grate surface 176 sq. ft. Pere Marquette No. 14 is to go into commission on Feb. 1.

An outgrowth of the car ferry type is a collier, Marquette & Bessemer No. 1, just built by the Buffalo Dry Dock Co. from designs by Mr. Kirby for the Pere Marquette Steamship Co. She is to run from Conneaut to Port Stanley and Rondeau, Lake Erie, in the coal trade and will be operated by the Pittsburgh, Bessemer & Lake Erie railway. It will, therefore, be seen that the Steel Corporation has a direct and active interest in this steamer in conjunction with the Pere Marquette company, Conneaut being

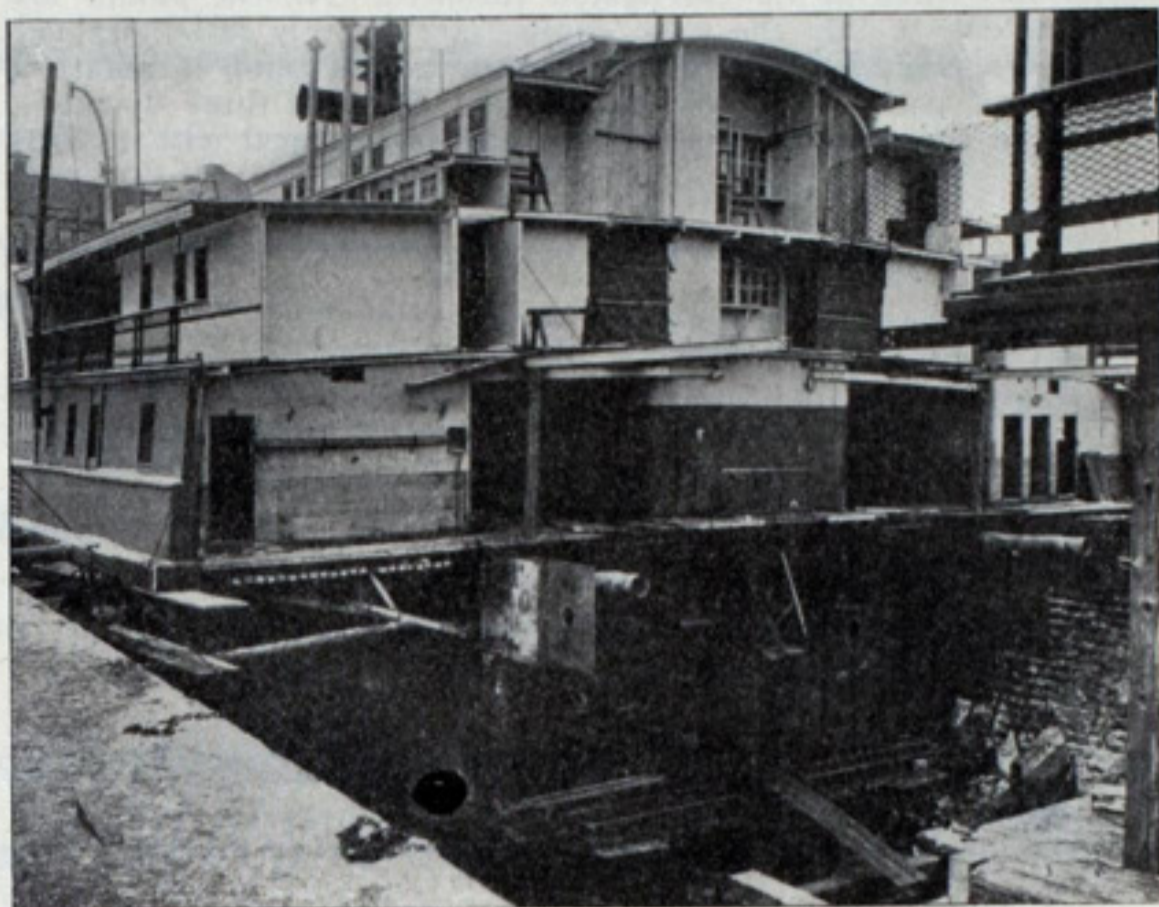
the Steel Corporation port. She is of Canadian canal size, being 255 ft. over all, 241 ft. keel, 43 ft. beam and 21 ft. 6 in. deep. Her novelty lies in the fact that she is constructed with a continuous hatch 144 ft. long and 28 ft. wide, extending from the machinery aft to the houses forward. Two railway tracks are fitted to permit the cars to run directly over this hatch. The track stringers on the hatch are made in four sections, each 36 ft. long, and hinged so as to lift out of the way to leave the hatch clear for unloading. The cross section, accompanying this article, will show the details clearly. During the passage across the lake the hatches are battened down with the Logan simplex hatch fasteners as on ordinary freighters. Chains are set across the hatches in the center of each section, set up with turn buckles with slip hook attached, to let them up easily and quickly. The purpose of the collier is merely to carry coal, and not cars, across the lake. The cars are run upon the collier and the coal is then dumped into the hold. As by this manner the fall is the least possible the lumps are subject to less crushing than by the ordinary dumps. The coal is unloaded on the Canadian side by means of unloading machines which, with the tracks raised, have an unobstructed field in which to work and will, therefore, be enabled to do their work with unusual dispatch. The coal, before entry, will be screened in order to take advantage of that part of the Canadian tariff laws which allows a differential for slack. As the collier will make the return trip light she is fitted with water ballast. Her engines are triple-expansion, 17, 27½, 46 in. diameter by stroke of 36 in., supplied with steam from one boiler 14 ft. 6 in. diameter by 12 ft. long, fitted with Howden draft and allowed 170 lbs. steam. There are three 42-in. Morison furnaces with independent combustion chamber, the heating surface being 2,509 sq. ft. and the grate surface 55 sq. ft. She also carries a pony boiler of 3 ft. diameter and 9 ft. high, allowed 100 lbs. working pressure. She has independent feed pump, ballast pump and pony pump and is lighted by electricity. She is to go into commission in the spring.

LENGTHENING THE CITY OF BUFFALO.

The lengthening of ships may be compared to a major operation in surgery. Both are a part of the general practice but are sufficiently uncommon to arrest attention when they occur. It is an event in a man's life to have his leg cut off; and it is certainly an event in a ship's existence to be bisected, to be drawn apart and to be joined again with a new section amidships. The purpose of lengthening ships is to increase their capacity without appreciably diminishing their speed or disturbing their symmetry. In

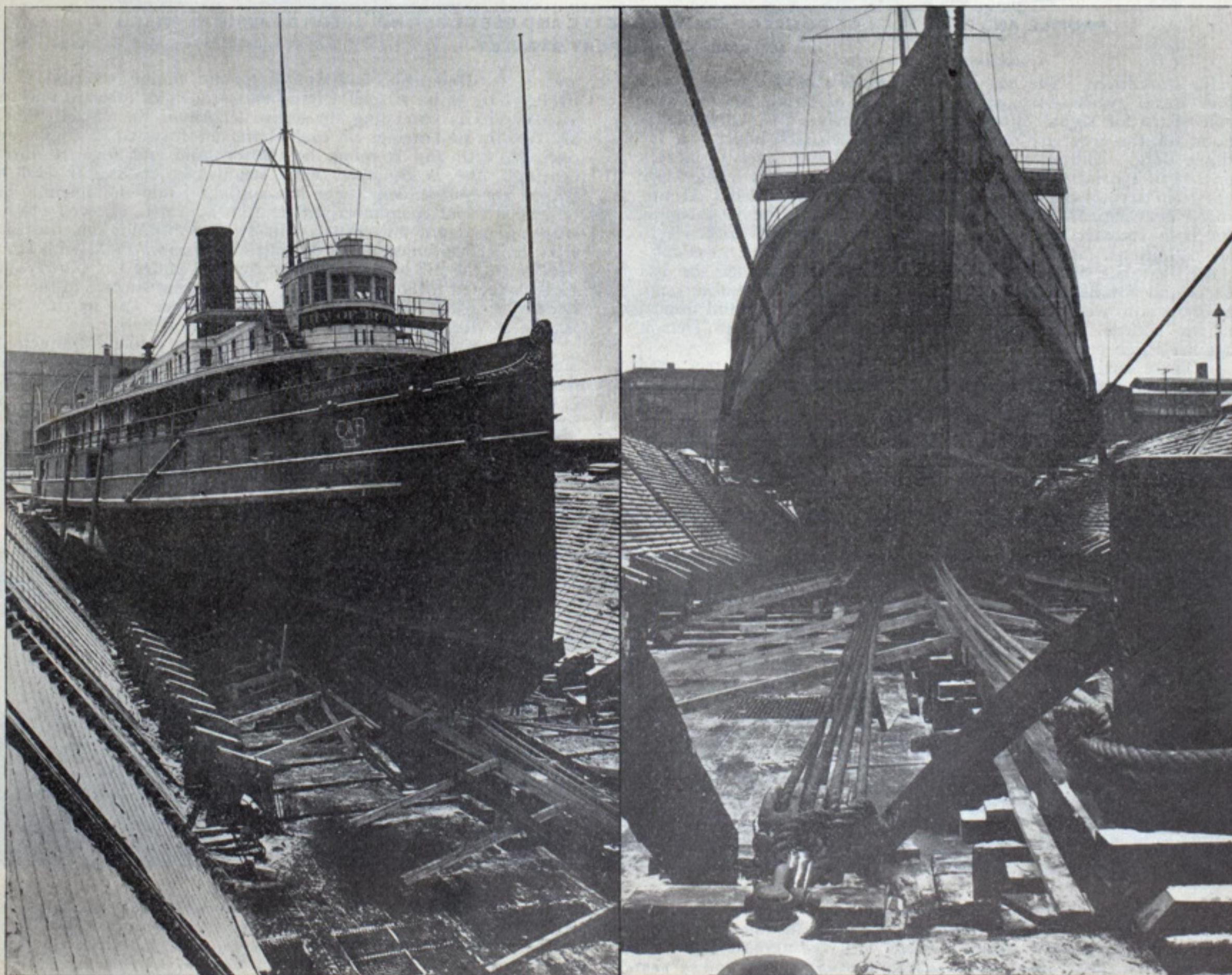
order to do this it is necessary to insert the new section in the middle, where it can be conveniently absorbed, making merely a continuation of the original line, or where an added fulness in the curve will not sensibly affect the steamer's speed.

Thus to preserve the stability of the side-wheel steamer City of Buffalo, which is now being lengthened at the Orleans street



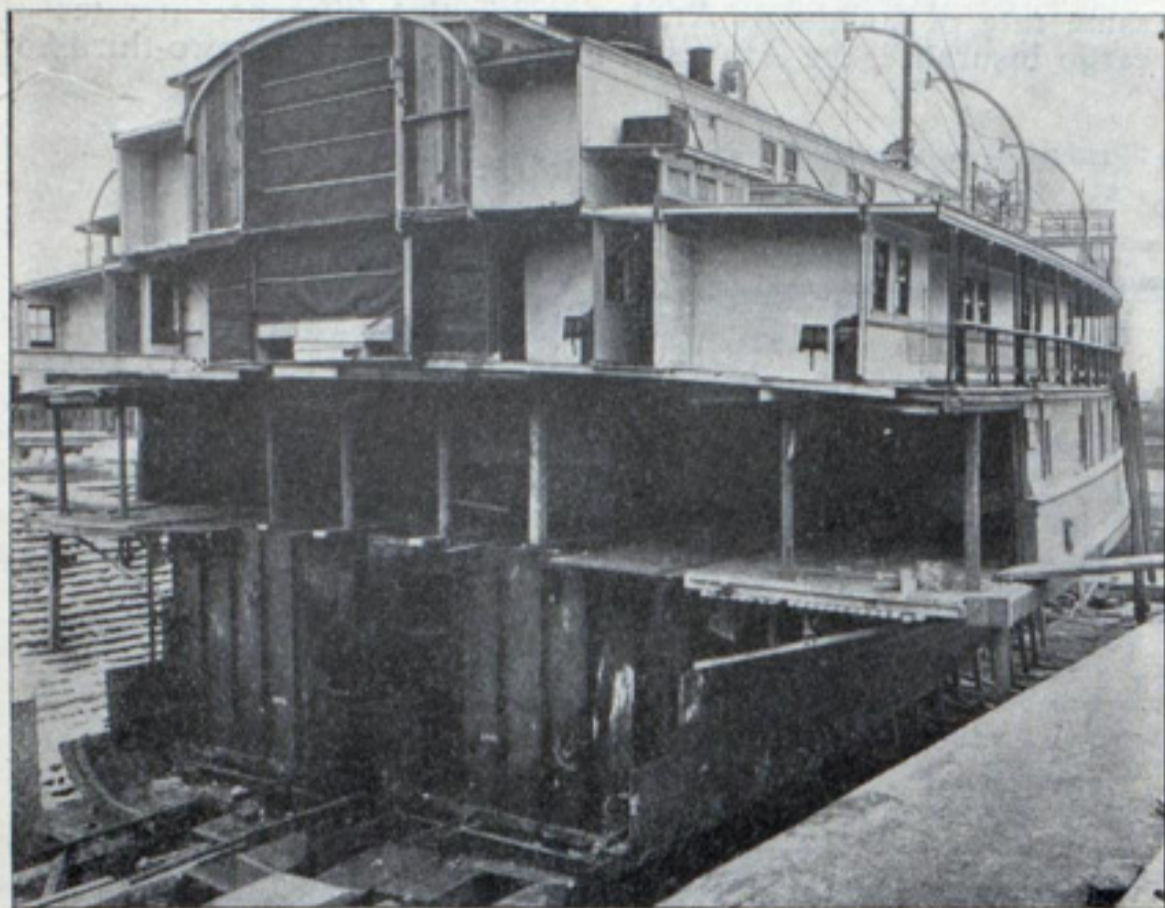
AFTER SECTION OF THE SEVERED STEAMER CITY OF BUFFALO.

yard of the Detroit Ship Building Co., the new section to be added will increase the steamer's beam below the water line by 3 ft., but it will not diminish her speed in the least, for at this point the curve of the vessel's sides offers slight resistance to the water. Speed is measured by bow and stern lines and not by midship lines. The lengthening of the City of Buffalo is being done under the guidance of Mr. Frank E. Kirby, who designed her. The new section to be inserted will increase the vessel's length by 42 ft. and increase largely her capacity for both freight and passengers. She



PHOTOS OF CITY OF BUFFALO TAKEN IMMEDIATELY BEFORE PULLING THE SEVERED SECTIONS APART.

was cut just abaft of the boilers, or what is the same thing, just forward of the engines, so that these vitals will be 42 ft. further apart in the new vessel, if such she may be called, than in the old one. In order to build a 42-ft. section into her it was necessary, of course, to pull the forward and after hulls 42 ft. apart. This was accomplished by merely pulling the bow section 42 ft. forward, the after section remaining stationary. The methods employed were very similar to those adopted in launching. Three



FORWARD SECTION OF SEVERED STEAMER CITY OF BUFFALO.

launching ways were built under the forward section, one on the port side, one on the starboard side and the other in the center. The ways were made slippery by the liberal use of linseed oil and tallow and were so constructed as to form a combination of sliding and stationary ways. Then by means of jacks and wedges the weight of the section, approximately 1,000 tons, was transferred from the keel blocks to the ways. When the power was applied the section moved along the sliding ways at the rate of about a foot a minute. Power was furnished by the shear-legs engine pulling on a cable attached to the bow of the steamer, while two powerful capstans pulled upon cables attached to either side of the vessel. These were employed for steadiness and alignment, and when at the end of forty minutes the section had been moved exactly 42 ft. it was found to be precisely in line to the measurement of a sixteenth of an inch.

The addition of 3-ft. beam to this vessel while she is being lengthened is, of course, the most interesting part of the work.

lery deck. The entire work is to cost about \$175,000, but this includes some improvements and alterations in the vessel other than the additional length. Trimming tanks are to be installed to take the place of the chain barrels that are rolled across the deck when a change of trim is required, the ship is to be redecorated and there is other miscellaneous work of a minor kind to be done.

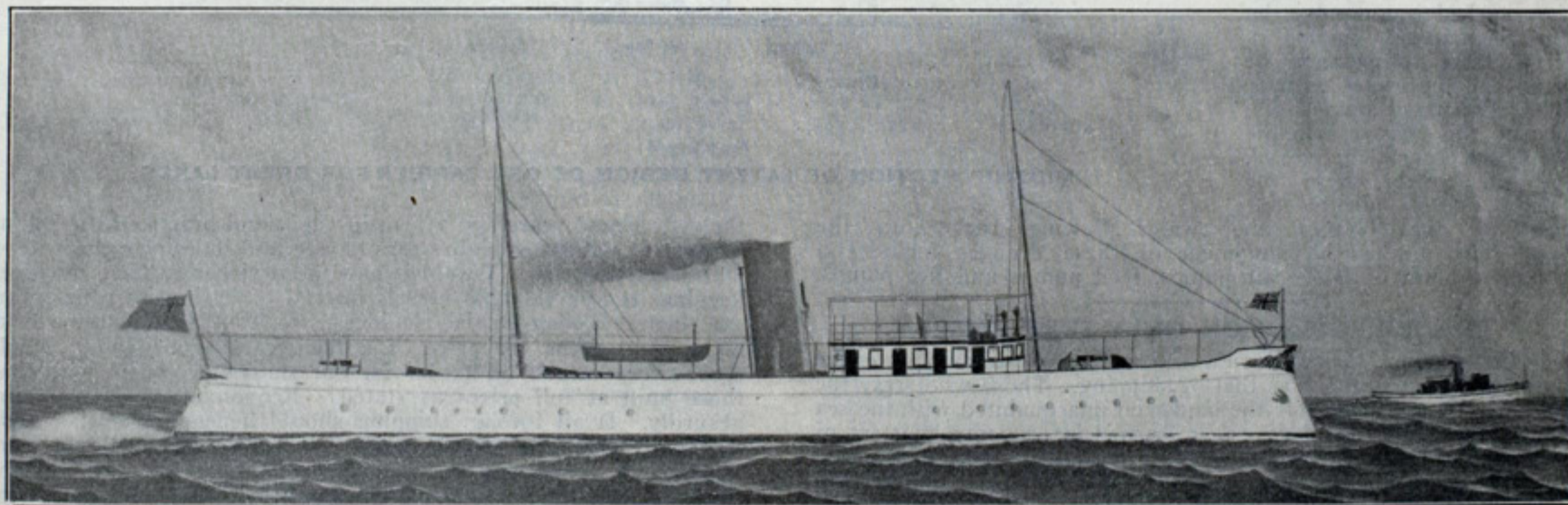
VESSELS FOR FISHERIES PROTECTION.

When the fishing cruiser which the Dominion government is now building at the yard of the Polson Iron Works, Toronto, is finished the piratical fishing companies which cross the boundary line will probably stay well within their own preserves. The new cruiser will be a flush deck vessel, having a ram bow and elliptic stern of a somewhat similar type to the smaller cruisers in the British naval service and she will be faster than any fishing tug on the lakes. Under forced draft she is to make 16 knots or better than 18 miles an hour. There is to be a commodious deck house near the foremast, containing reception room, chart room and galley with a bridge above it extending from side to side of the vessel. The vessel will be schooner-rigged with jib-headed foresail and mainsail. The hull will be of open hearth mild steel, capable of withstanding all the tensile, cold and temper tests of Lloyd's and the vessel is to class 100 A1 at Lloyd's. The cruiser's dimensions are: Length on load water line, 176 ft.; beam, molded, 22 ft.; depth from top of keel to top of main deck, 14 ft. 3 in.; draught, loaded with 50 tons of coal, 8 ft.; bunker capacity, 75 tons. She will be fitted with two sets of triple-expansion engines having cylinders 13½, 22 and 36 in. diameter by 21 in. stroke, supplied with steam from two Scotch boilers, 11½ ft. in diameter and 13 ft. long, built for a working pressure of 200 lbs. and fitted with forced draft. The vessel will have eight watertight bulkheads. The accommodations for officers and crew are all arranged below the main deck and are well provided with light and air. In the matter of auxiliary machinery she will have a steam steerer of ample capacity, a complete electric light outfit of sixty incandescent lights and a powerful searchlight. The vessel will have a very handsome appearance and is entirely the product of the Polson Iron Works' staff, the government accepting her without the slightest modification. She will be ready to go into commission early in the summer, and is expected to attain a speed of 12½ knots under natural draft at 850 I. H. P., and, as noted above 16 knots under forced draft at 1,800 I. H. P.

A cruiser that is being built by Vickers, Son & Maxim of Barrow-in-Furness, England, for the protection of Atlantic coast fisheries is to be 200 ft. long, 25 feet beam, 14 ft. deep and of 10 ft. draught. She is to be electrically lighted throughout, and fitted with a very powerful search-light, and is to carry a crew of about 100 men all told.

FERRYBOAT FOR VANCOUVER.

The Polson Iron Works, Toronto, is building a composite double-ended steam ferryboat, intended for the carriage of horses, wagons and passengers across Burrard inlet, British Columbia,



DOMINION CRUISER FOR FISHERIES PROTECTION ON LAKE ERIE.

[Building by Polson Iron Works, Toronto.]

For about 50 ft. forward and aft of the new center section on both sides of the vessel all of the plating will necessarily have to be removed and some of the frames changed so that the 1½-ft. additional beam on either side, beginning at the new section, may be gradually reduced, running fore and aft, until it works into the bow and stern sections that need no change. In this way there will be no evidence when the work is completed of the vessel having been cut for additional length. To all appearances she will be a vessel built for 42 ft. more length and 3 ft. more beam than she had when she was launched. Of course the vessel's stability is very much increased by the additional beam. Mr. Kirby says he is fully satisfied that the change will give the City of Buffalo an increase of 50 per cent. over her present freight capacity. The great increase in passenger accommodations will not come alone from the new middle section. The plan of a double tier of staterooms on either side of the gallery deck, which has proven successful on the Detroit-Buffalo boats is to be applied to the City of Buffalo while the work of lengthening her is under way. The City of Buffalo now has only one line of staterooms on either side of the gal-

lery for the North Vancouver Ferry Co. The steel work for this vessel will be fitted up complete in Toronto, then taken down and re-erected at Vancouver, where it will be riveted up and the woodwork and equipment completed. The firm has had much experience in this kind of work and is well equipped for it. The dimensions of the vessel are: Length over all, 148 ft.; beam over hull, 28 ft.; beam, extreme, 45 ft.; draught, 6 ft. 2 in., with a capacity for twelve double teams and 600 passengers. The vessel will be fitted with one set of fore-and-aft compound engines, having cylinders 14 and 28 in. diameter by 20 in. stroke, and two Scotch boilers, 7½ ft. diameter by 10 ft. long, built for a working pressure of 150 lbs.

The Polson Iron Works is also constructing a fast river barge for the Roman Catholic Mission in the Peace river district. She is 80 ft. long, 15 ft. beam and 5 ft. draught, having fore-and-aft compound engines, 7 and 14 in. diameter by 10 in. stroke, equipped with a Fitzgibbon boiler. The steel work will be fitted complete, then, packed up carefully to be re-erected, planked and completed when it arrives at its destination.

constitutional, as it is not. There is nothing more certain in ship-owning than this: Competition of flags for international carriage does not compete. If it could or would there are very few nations willing that it should. With vessels of his own flag in port why should a British, German, or French merchant load an American ship? The ship of his own flag will make as low a rate as any rival and she will therefore naturally be preferred, there being no inducement to load our ship. Under our early policy our laws fixed inducements. We were, unfortunately, induced to remove them. They were protective, and built up our early marine. Foreign nations wanted a better chance at our shipping and we gave it to them, so generous we were. Only chronic inconsistency since keeps up the unprotection of our shipping. While human nature governs human action, the merchants and underwriters of foreign nations, now carrying on our trade, will prefer to employ the vessels of their own flag. No delusive reasoning or illusive legislation will ever make this otherwise. Between flags, indifference is not to be expected, yet it is on this assumption that our government continues our false policy.

Our commerce is—nine-tenths of it—in the hands of foreign merchants, carriers and underwriters, the one supporting the others. Does one of these feel under obligations of any sort to make way for American merchants, carriers or underwriters? We invited them to our table and that they have eaten us out of house and home is our own fault. We should have kept them, one and all, at proper distance. Now, how shall we get rid of them and put our own people and shipping in place? Not by continuing the policy by which they have been enabled to cut out our people from the transportation of their own commerce. That policy must necessarily go. No "compensation" can ever correct its evil operation. Any theory of trade that does not recognize racial distinctions, the bias of national attachment, and the prejudice begotten of historical associations is unphilosophical and untrustworthy. Yet our government adopted such a theory in 1828—to the loss of our place upon the ocean.

Thanks to nature, there is a principle fit and true that we should lay hold of and depend upon for the speedy restoration of our shipping power, and that is the principle of so regulating our foreign commerce as to favor our own shipping and thus assist our own people to carry it on. It is our right, as it is our national duty, to do our own work on the sea as on the land. Every nation has a proprietary interest in the carrying of the commerce which it originates and maintains. This interest belongs to no other nation, nor can any other obtain it by right. The small nation has the same right as the large one to build vessels and put them on the sea and carry its own productions to market. No shipping monopoly is permissible, but every nation should freely enjoy its right to carry on its own commerce with its own vessels. Where two nations have intercourse the carriage belongs in part to each. They may reciprocate in carrying, but one lacking vessels of its own to carry its share should courteously prefer those of the nation with which it deals to other foreign; and neither has the right to resort to the creation of advantages whereby it may run the other's vessels out of use.

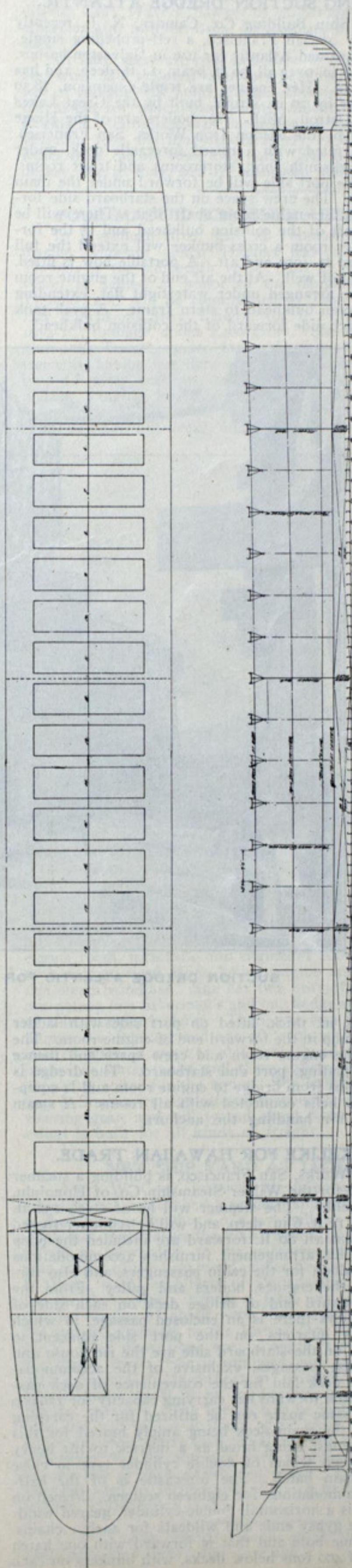
A recent issue of the Review contained an account of the sugar trade with Cuba at Matanzas and Cardenas, in which it appeared that American carriage to our market—the only one existing—was less than 3 per cent. From Cardenas alone the percentage was by American vessels, 1.06; Cuban, 1.16; Danish, 1.57; Spanish, 9.62; Norwegian, 11.62; and by British, 76.00 per cent. Here was 97.78 per cent. of commerce carried by shipping of countries to which neither the trade nor the transportation belonged. The carriage of every pound of this freight belonged of right to Cuban or American vessels. A simple regulation of commerce would give it to them, no matter about the cost of vessels and the wages of crews, matters entirely extraneous and irrelevant under a proper policy.

Over 43 per cent. of our foreign commerce comes and goes as in the case just described—not a pound of the freight belonging to the vessels that carry it but all of it in the reach of our own, if our government will simply restore to American ship owners their natural rights, sacrificed by the act of 1828, and subsequent conventions. In the domestic trade our owners enjoy their shipping rights under trade regulations; why should they not in the foreign trade? The constitution provides that every citizen, and every class of citizens, shall have justice in legislation, but justice to American ship owners, and to their industry in foreign trade seems harder to wrest from our rulers at Washington than was our political freedom from the rulers of Great Britain. Seven long years of warfare worked that out, but it is now thirty-five years since our ship owners besought congress to exercise the needed statesmanship for shipping restoration. The lookout at the masthead has reported many times that this exercise was "right ahead," but only a fog-bank materialized, only subsidy talk eventuated. The country is wearied of procrastination; ship owners are tired of playing beggar at Washington, but having learned their rights, they intend henceforth to demand them of the government.

WILLIAM W. BATES.

Denver, Jan. 20, 1904.*

The dangers of winter navigation along the Nova Scotian coast is illustrated by the following extract from a notice issued by the Canadian department of marine Jan. 12: "All the bell buoys are upturned by ice gathered on the arms and bars. Storms have disarranged our coast buoys rendering many unreliable.



DECK AND LONGITUDINAL PLANS OF LATEST DESIGN OF ORE CARRIER FOR THE GREAT LAKES. MIDSHIP SECTION ON OPPOSITE PAGE.

On the opposite page is a midship section of the lake freight steamer of which longitudinal and deck plans appear above, and which is known in the Cleveland yard of the American Ship Building Co. as No. 422. This vessel is building for Charles L. Hutchinson and others of Cleveland. A vessel of similar construction but 58 ft. longer and of 2 ft. more beam is being built for G. A. Tomlinson of Duluth. These vessels have great open decks—

hatches spaced 12 ft. between centers—and in their interior hold arrangements embody an arch system of construction that is new and which is intended to facilitate, with the great number of hatches, the unloading of iron ore by clam-shell buckets. It is expected that 6,000 to 8,000 gross tons will very often be removed from these specially-designed ore carriers in a single day or in even less time under favorable conditions. The Hutchinson steamer is

436 ft. over all, 416 ft. keel, 50 ft. beam and 28 ft. depth of hold. She is costing about \$270,000 and is designed to carry 6,700 to 6,800 gross tons. Her engines are triple expansion, cylinders 22, 35 and 58 in. diameter by 40 in. stroke. She will have two Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in., fitted with Ellis & Eaves draft and built for a working pressure of 170 lbs. The Hutchinson is to be out early next spring.

SELF-PROPELLING SUCTION DREDGE ATLANTIC.

The New York Ship Building Co., Camden, N. J., recently built for R. A. Perry of San Francisco, a self-propelling single-screw suction dredge named Atlantic for use in Galveston harbor. The dredge is 160 ft. 8 in. over all, 30 ft. beam, 14 ft. deep, and has a draught of 7 ft. 6 in. Her engines are triple-expansion, 18.30 and 48 in. in diameter by 20 in. stroke, built by the Great Lakes Engineering Works, Detroit, Mich. Her boilers are of the Heine water-tube type, built by the Risdon Iron Works, San Francisco. The dredge is to be fitted with a raised fore-castle deck, under which will be the blacksmith shop, storerooms and toilet rooms. The crew space on the port side will be forward under the main deck, with hold abaft. The crew space on the starboard side forward will have the cutter engine room abaft of it. There will be two chain lockers abaft of the collision bulkhead and at the forward end of the boiler room a cross bunker will extend the full breadth of the ship, 12 ft. fore and aft. A portable bow is fitted, filling the forward end of well. At the aft end of the engine room a shaft tunnel will be arranged under watertight flat, extending from aft of engine room bulkhead to stern frame. A peak tank is fitted aft and on each side forward of the collision bulkhead.

A steel superstructure extends from bulkheads 12 to 46, 20 ft. 1 in. in breadth, containing engine and boiler casings, officers' quarters, mess room and bath room, galley, pantry, crews' lavatories, machine shop and hoisting winch room. The steel pilot house occupies the forward end of the superstructure. Two spuds are arranged aft, passing through the plate wells. The vessel will be rigged with one pole mast and cargo boom. The general scantlings and quality of the steel hull and wood decks conform to the rules and regulations of Lloyd's register of shipping.

The suction pump is located in the engine room and is driven by the propelling machinery. The suction and discharge pipes are 26 in. inside diameter and $\frac{3}{4}$ in. thick, fitted on port side with ladder well, leading to the pump in the forward end of engine room. The pipes lead through the engine room and crew space and thence through the outside plating, port and starboard. The dredge is supplied with telegraphs from bridge to engine room and is equipped with electric call bells connected with all rooms. A steam capstan is provided for handling the anchors.

STEAMER LIKELIKE FOR HAWAIIAN TRADE.

The Union Iron Works, San Francisco, is building a steamer of an interesting type for the Wilder Steamship Co. of Honolulu, to be named the Likelike. The steamer will be of steel, 136 ft. long, 30 ft. beam and 12 ft. 6 in. deep, and will be schooner rigged with two masts. From aft 80 ft. forward are included the poop and bridge decks. This arrangement furnishes accommodations for the officers and saloon for the cabin passengers, and also furnishes housings for the engines, boilers and galley. From the poop deck to the forward end of bridge deck on each side of engine and boiler fidleys there is an enclosed passage, in which are placed firemen's quarters on the port side adjacent to the engine room, and on the starboard side are the ice house and toilet rooms. In these passages, exclusive of the accommodations mentioned, is a deck laid for the convenience of deck passengers. The main deck forward has carrying capacity for 150,000 ft. of lumber. The same space can be utilized for the carrying of heavy machinery, the main deck being amply braced for this purpose and the foremast being fitted as a derrick to lift heavy cargo, with steam cargo winch of double cylinder type in close connection to the main hatch. The fore-castle is of the half-sunk type with accommodations for eighteen seamen. Placed on top of the fore-castle is a horizontal, double-cylinder, geared windlass, fitted with large gypsy ends and wildcats for anchor chains. The vessel has but one hold and that is forward with one hatch and has a capacity of 400 tons below decks, with bunkers on each side of the boiler containing 31 tons each. Cabin accommoda-

tions for twenty-one first-class passengers are all on the poop deck. On the bridge deck are placed the pilot house and captain's rooms.

The main engines are 13 and 28 in. in diameter by 21 in. stroke, indicating 300 H. P. at 130 revolutions and designed for a speed of $9\frac{1}{2}$ knots an hour on 6 tons of coal. The boiler is 10 ft. 10 in. in diameter by 11 ft. 1 in. long, allowed 150 lbs. working pressure and equipped with two 42-in. Morison suspension furnaces.

The steamer is built for special trade and requires extra heavy fittings. The hull is double plated from fore-castle deck to keel in wake of anchor for about 12 ft. back from the bow. The stem is also protected by a 7-16-in. steel shoe from 2 ft. above load line to 14 ft. after the perpendicular. This is to protect the wear of the anchor chains on the stem, for, as a matter of fact, in this trade a set of hawser pipes will wear out in two years. The steamer is fitted with electric lights throughout, including the mast head, side and riding lights. The vessel carries three cargo boats of about 380 cu. ft. capacity each. These boats are hoisted by steam, as are also all the sails. An anchor windlass is also provided to take in both chains, 90 fathoms each, at the

same time in two minutes. The vessel is built to the highest class under Bureau Veritas for single-deck vessels, being constructed under special survey for special services.

MARINE RAILWAY.

At Sault Ste. Marie, Mich., Hickler Bros., who have a ship yard of moderate proportions, recently put in one of the improved Crandall railway dry docks. It is especially suited to the kind of work that is done at the Sault and was erected by the H. I. Crandall & Son Co., engineers and contractors of East Boston, Mass.

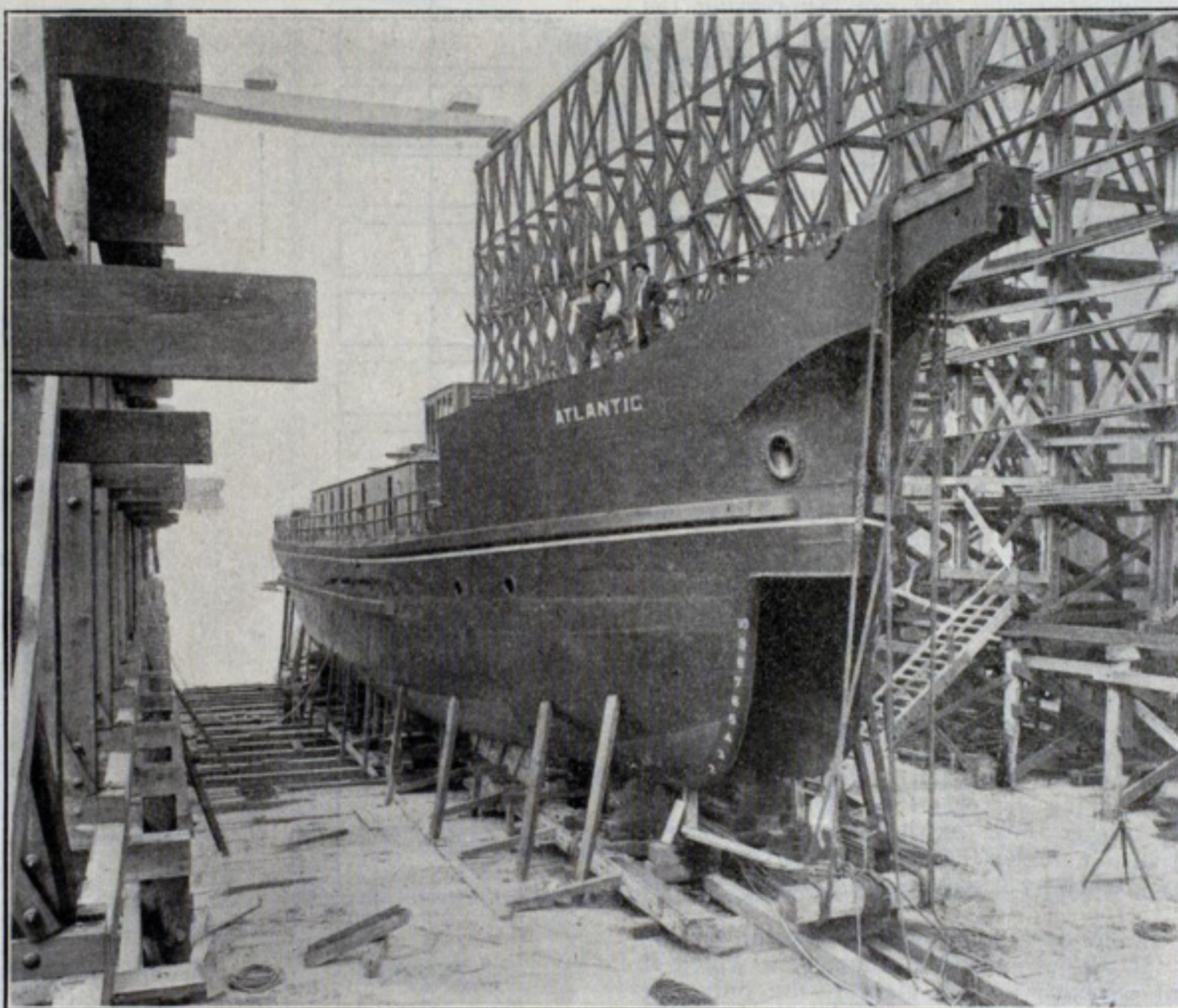
This railway dry dock has a capacity of 1,000 tons, deadweight. It is constructed of timber and is of the three-track type. The cradle is 180 ft. over keel blocks, 50 ft. wide, and is

equipped with ten bilge blocks on each side, which are moved in and out by individual winches, operated from the platforms which extend the length of the cradle. The cradle is operated by especially-constructed marine railway chains of the highest grade. A vessel of the full capacity may be hauled smoothly and readily in twenty minutes from the time it is centered on the keel blocks, which is a strong point in favor of this form of dry dock. The dock has been in operation since September last and has proven very satisfactory in all respects.

VESSELS FOR THE LIGHTHOUSE DEPARTMENT.

The lighthouse board is now designing a lighthouse tender for St. Mary's river (eleventh lighthouse district) and a relief light vessel to be stationed at the lighthouse depot, Charlevoix, Mich., which is in the ninth district. Bids for the construction of these vessels will be solicited shortly. In addition the following vessels are now under construction for the lighthouse board: Light-house tender Ivy for the seventh district and lighthouse tender Magnolia for the eighth district, both being built by the Baltimore Ship Building & Dry Dock Co., Baltimore, Md. The New York Ship Building Co., Camden, N. J., has under construction five light vessels as follows: Relief light vessel No. 78 for the third district; light vessel No. 79 for Five Fathoms' bank, N. J., fourth district; light vessel No. 80 for Cape Lookout shoals, North Carolina, fifth district; light vessel No. 81 for Heald bank, Texas, eighth district; light vessel No. 83 for Blunt's reef, Pacific ocean, off Cape Mendocino, Cal., twelfth district.

The Townsend-Downey Ship Building Co., Shooter's island, New York, is building the lighthouse tender Crocus for the tenth district, which includes Lakes Erie and Ontario. The Burlee Dry Dock Co., Port Richmond, N. Y., is building light vessel No. 76, to be stationed at the lighthouse depot, Tongue Point, Ore., for the thirteenth district.



SUCTION DREDGE ATLANTIC FOR R. A. PERRY, OF SAN FRANCISCO.

[Built by the New York Ship Building Co., Camden, N. J.]

NEW CANADIAN LIGHTSHIPS.

The Polson Iron Works, Toronto, Ont., recently completed and dispatched to its destination one of a pair of steel lightships, which it is under contract to build for the Dominion government. These vessels are the first of their class built in Canada and are along the line of the lightships used in the United States, but with many improvements. They have a large amount of freeboard and are sheered very high in the bows, so as to keep dry when pitching in a heavy sea. They are in excess of Lloyd's requirements for vessels of their size, and have watertight bulkheads, which will make them almost absolutely unsinkable.

The Lurcher No. 14, which left for its destination just before navigation closed, has a length over all of 124 ft., beam 28 ft., depth from top of keel to spar deck 21 ft. 6 in., draught, fully loaded, 11 ft. 6 in. It has two steel pole spars, on which, 50 ft. above the deck, are swung three powerful electric lamps on each spar. The galley surrounding the lamps serves for a day mark. There is a large automatic fog bell and fog siren worked by compressed air. Fresh water tanks of 60,000 gallons capacity contain water for drinking and to supply waste in the machinery.

The engine is of the high-pressure, surface-condensing, vertical, marine type, cylinder 23 in. diameter, with 22 in. stroke. Steam is supplied by two navy-type boilers, with a working pressure of 140 lbs. All the pipes are of copper. The vessel will be moored by three mushroom anchors, each weighing 5,000 lbs. The mooring chains are 1 5/8-in. stud link, specially made and tested for this work. The ship is furnished with 240 fathoms of this chain, also with 120 fathoms of 1 1/4-in. stud link chain. The auxiliary outfit is most complete, and comprises steam windlass, capstans, pumps, electric gears, steering gear, etc.; also complete life-saving apparatus constituting it a well-equipped life station. The fittings and furnishings throughout are first class in all respects and provide everything requisite for the comfort and convenience of the crew.

The Lurcher will be stationed at the Lurcher shoals in the Bay of Fundy, off the Nova Scotia coast. The second lightship, which will not be completed till next spring will be stationed off the island of Anticosti in the Gulf of St. Lawrence.

SHIP BUILDING IN MAINE.

Ship building in Maine, mostly wooden vessels, for the past year compares favorably with 1902 but is about 10,000 tons less than in 1901. The estimated total for 1903 is 36,055 tons; in 1902, 37,201, and in 1901, 47,146. The Bath district, as usual, leads, while Waldoboro, in which is included Rockland, Thomaston and Waldoboro, is second in place. The tonnage by districts was as follows: Bangor, 1,237; Bath, 21,310; Belfast, 9,122; Castine, 97; Machias, 207; Passamaquoddy, 817; Portland, 105; Wiscasset, 1,143; Waldoboro, 9,855. In the latter district, the vessels built included the steamer Mohegan and schooners Washington B. Thomas, which was lost off Sutton's island, near Old Orchard; the Robert H. McCurdy, William Bisbee, E. Marie Brown, Dorothy Palmer, Hattie Taft, and Edgar W. Murdock.

Prospects in the Bath district are especially encouraging. The Edward H. Cole, now building for Crowell & Thurlow of Boston, at Cobb, Butler & Co.'s yards in Rockland, and which is of about 1,700 tons carrying capacity, will be launched the latter part of January, and probably before that time the keel for another schooner for Capt. C. W. Sprague of Stockton Springs will be stretched there. In Thomaston the Helen Thomas is now building at Washburn Bros.' yards, while Dunn & Elliott have another four-master building, and in Waldoboro a 2,500-ton five-master is being built for the Palmer fleet and will be ready to launch in April.

In the Belfast district Capt. H. M. Bean of Camden will build two schooners of 2,500 and 2,200 tons respectively, and over at Rockport Carleton, Norwood & Co. are building a four-master for Capt. J. B. Crocker of Franklin, who last year had the Joseph G. Ray built in Rockland.

At Vinalhaven the Margaret M. Ford has been under construction for an unusually long period by Capt. A. M. Webster, owing to the inability to secure ship carpenters. The vessel is 142 ft. keel and 34 ft. beam. When she is launched Capt. Webster will build a vessel for himself, the Margaret N. Ford being principally owned by Joseph Ford of Boston.

There is not much doing in the Belfast district with the exception of the large dredge which George A. Gilchrist is preparing

to build for the United States government, while in the Machias district Capt. Warren Sawyer of Milbridge will build a 1,500-ton schooner and Sawyer Bros. contemplate building two three-masters.

At Bath there are now in course of construction five schooners, with half a dozen contracts pending, and E. & I. K. Stetson of Bangor will build a large schooner for Capt. Hutchinson, the model for which was recently finished by J. J. Wardwell of Rockland. Bath also has the honor of having launched the last vessel in 1903, the four-master Harry F. Kreger, which took the water from the old Reed ship yard. She is of 1,250 tons, a double decker, 202 ft. long, 40.2 ft. beam and 21.8 ft. deep.

FOUR-MASTED SCHOONER HELEN THOMAS.

In Washburn Bros.' yard at Thomaston, Me., the new four-masted schooner Helen Thomas was launched recently. The Thomas is the thirteenth vessel built by Washburn Bros. The vessel is named in honor of the daughter of Washington B. Thomas, and will be commanded by Capt. William J. Lermond. Her dimensions are: Length, 195 ft.; breadth, 40 1/2 ft.; depth, 19 1/2 ft.; tonnage, about 1,400 gross. She is built of a solid Virginia oak frame, square fastened with 1 3/8-in. iron, and locust treenails, having five tiers of sister keelsons, 15x15 in., and three tiers of sister keelsons, 14x14 in. She has a full set of hackmatack hanging knees under each deck. Her planking is of yellow pine, 4 1/2 in. thick, and the ceiling is of the same material. She has three full decks, and is fitted with every modern device throughout.

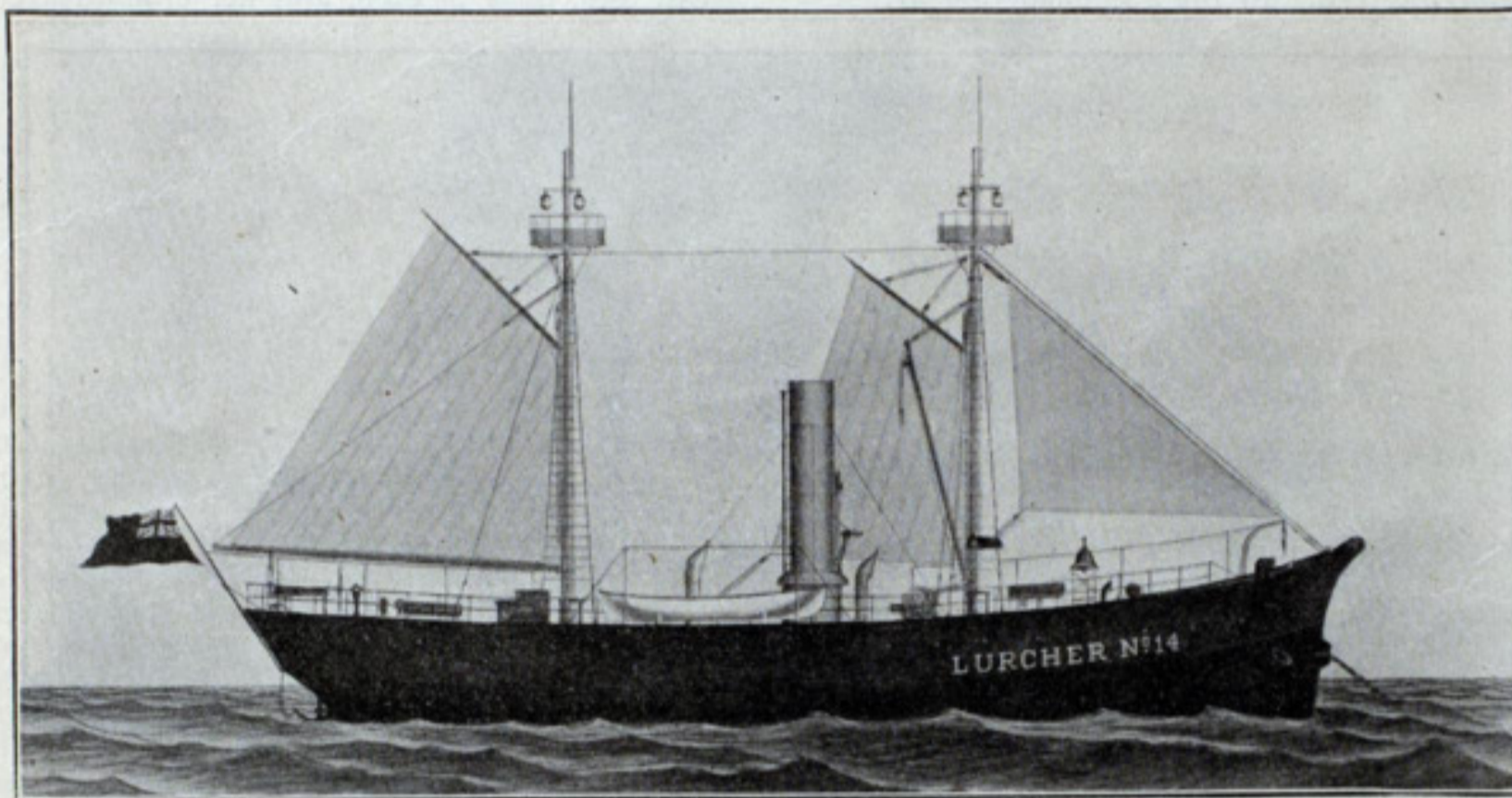
Her masts are whole sticks of Oregon pine, each 100 ft. long; topmasts 52 ft. The vessel has three houses, aft, midship and forward and after cabins, captain's room, mate and second mate's rooms, two spare staterooms, pantry, chart, toilet, bath and store-rooms. The after cabin is a spacious apartment and is finished in quartered oak, cherry, and sycamore. The forward cabin is finished in the same woods and is also a neat and convenient room. The whole

after house is well lighted and is heated with steam radiators. The captain's room is finished in oak. The midship house has dimensions of 18x18 ft., and contains the galley, mess, steward and boy's rooms. The forward house is 22x24 ft., and within it is the engine room, forecabin and engineer's room. The vessel is fitted with a good-sized Hyde boiler, engine and hoister, and a Camden steam windlass. She has two heavy bow anchors, one stock, one patent, one fisherman's and one kedge anchor, and 210 fathoms of 2-in. standard chain. There are two Worthington wrecking pumps, one forward and one aft, each with a capacity of 440 gallons of water a minute; also three hand pumps. She has three large iron water tanks, and three galvanized iron tanks extra for supplying water for the house. She is fitted with John A. Roebeling & Son's wire rigging and turnbuckles, has Robinson's patent steering gear, and will spread about 6,000 yards of canvas. The vessel is built for all kinds of freight.

NEW SHIP YARD AT JACKSONVILLE.

Henry W. Cook, formerly identified with lake transportation interests, has established a modern ship yard in close conjunction to the Cummer Lumber Co.'s saw mills at Jacksonville, Fla. Mr. Cook has undertaken the construction of a new fleet of vessels to aid in forwarding to the northern markets the large yellow pine output of the Cummer Lumber Co. of Jacksonville. Matteson & Drake, naval architects of Philadelphia, prepared the designs for the fleet, which include a large sea-going steel tug and six wooden barges of about 1,200 tons capacity each. Contract for the tug has been let to the Burlee Dry Dock Co., Staten island, N. Y. Her dimensions are: Length, 137 ft. over all; beam, 27 ft.; depth, 16 ft. She is equipped with triple-expansion engines, with cylinders 16, 25 and 42 in. diameter by 30 in. stroke; one Scotch boiler 14 ft. 6 in. in diameter and 12 ft. long, allowed 180 lbs. pressure. The barges will be built of long leaf southern pine and will be 191 ft. long, 35 ft. beam and 19 ft. deep. They will carry their entire load of yellow pine below decks. Mr. Cook announces that the new ship yard is prepared to furnish estimates on any size or style of wooden vessel. Inquiries may be sent to the ship yard at Jacksonville, Fla., or to Matteson & Drake, 706 Bourse, Philadelphia.

C. S. Taylor, harbor master at St. John, N. B., for thirty years past, died there a few days ago.



LIGHTSHIP LURCHER NO. 14 FOR THE DOMINION GOVERNMENT.

[Built by Polson Iron Works, Toronto, Ont.]



PANORAMIC PHOTOGRAPH OF HOWARDS' SHIP YARD, JEFFERSONVILLE, IND.

Types of American River Steamers.

The steamers of American rivers are peculiar and alone. They are a type which the exigencies of the service have made necessary, for they have always to encounter shifting bottoms, snags and shoals and are consequently of the lightest draught. One of the most enterprising of the river ship yards is that of E. J. Howard at Jeffersonville, Ind. In the accompanying article some of the types of river steamers are illustrated. Three of his latest are the Senator Cordill, the City of Savannah and the Columbia. The Senator Cordill is said to be one of the finest of river steamers. She was built for the Natchez & Vicksburg Packet Co., and is 175 ft. long, 34 ft. beam and 6 ft. deep. She was designed for speed, safety and comfort. She has forty large staterooms, which are lighted by electricity and heated with steam. Her engine power is in two high-pressure cylinders, 16 in. diameter by 7 ft. stroke, supplied with steam from three boilers, 26 ft. long and 44 in. in diameter.

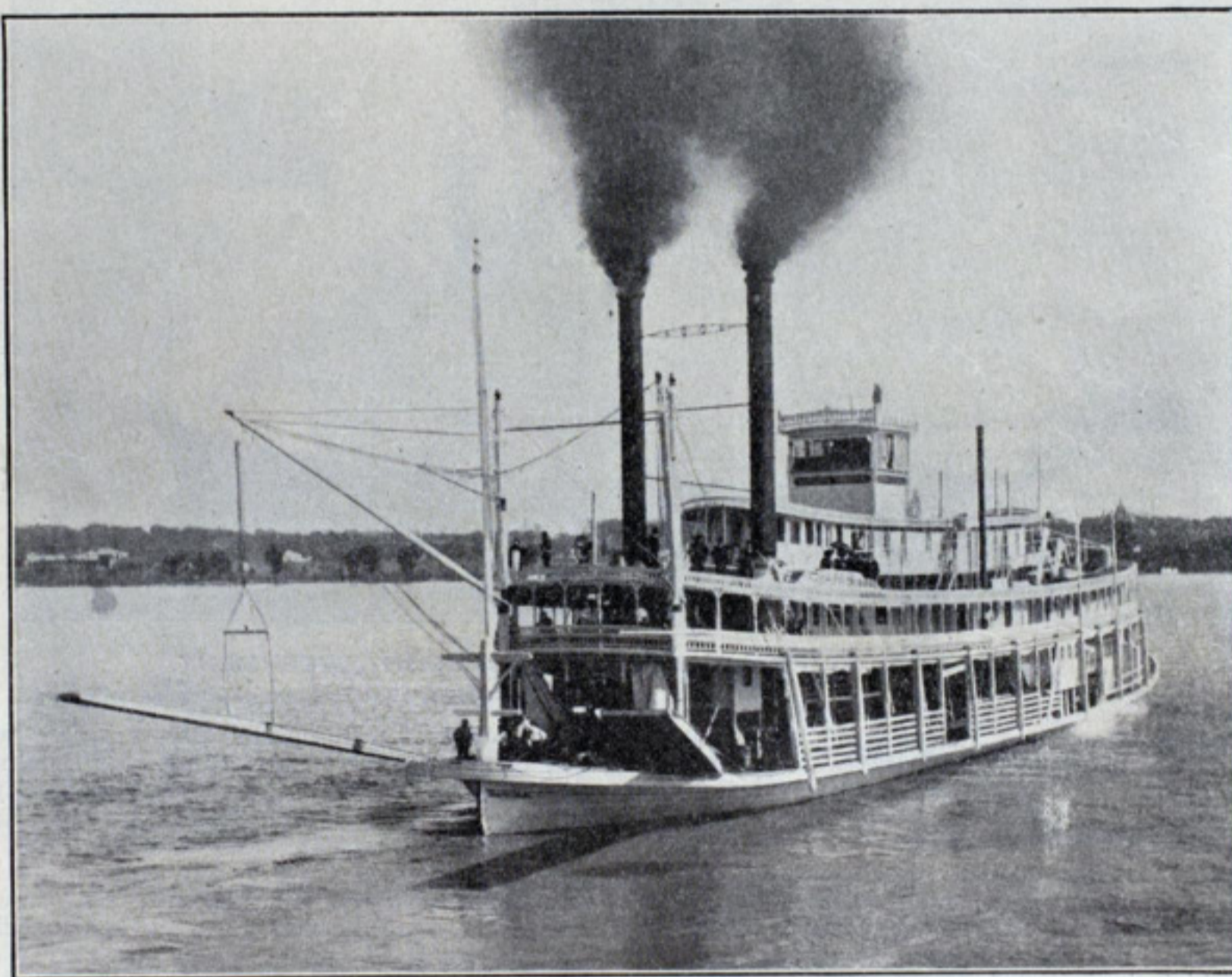
The City of Savannah was built for the St. Louis & Tennessee River Packet Co. and is 200 ft. long, 38 ft. beam and 6 ft. depth of hold. She is especially adapted for the low-water season, being a vessel of surprisingly light draught for her size. She has a very roomy cabin and Texas of handsome design, with steam heat and electric lighting. Her engine power is in two high-pressure cylinders, 16 in. diameter by 6 ft. stroke. Steam is supplied by three boilers, 26 ft. long and 44 in. in diameter. Her freight capacity is 1,000 tons.

The Columbia, just completed, is owned by Captains H. M. and E. G. Carter, operating at New Orleans under the name of the Carter Packet Co. The Columbia is 170 ft. long, 30 ft. beam and 4½ ft. deep. The sheer of her hull forward is 3 ft., her high bow giving her a very striking appearance. She measures 13 ft. between decks and her carrying capacity is estimated at 2,000 bales of cotton. Her cabins are full length with a hall 3½ ft. wide running through the center. In the main cabin is a social hall forward measuring 15 by 16 ft., the office and bar each measuring 6½ by 9 ft., the office being furnished with double desks of highly-polished chestnut and the bar with buffets and lockers of the same wood. The staterooms in the main cabin, twelve in number, measuring 6 ft. 2 in. square, are provided with double bunks. Between the main cabin and the ladies' cabin is a dining hall 15 ft. square, furnished with oak tables and chairs. In the ladies' cabin are six staterooms, each 6 ft. 2 in. by 6½ ft., and to the rear is a ladies' reception room, neatly furnished and measuring 8 by 20 ft. Aft of the ladies' cabin is another hallway, on either side of which are two large lockers or storerooms. Then comes a wide gangway extending across deck, and to the rear of all the kitchens and pantries. The boiler deck, which is 20 ft. wide, extends forward of the cabin 15 ft., and the guards

are 2½ ft. wide, extending out to 4 ft. from the rear of the ladies' cabin. Between decks on either side of the engine room is a barricade 7 ft. wide and 34 ft. long, to be used as sleeping quarters for roustabouts and deck passengers in cold weather. The Columbia has two steel boilers, 36 in. in diameter and 24 ft. long, with 6-in. flues in each, and her engines are of the D. M. Swain

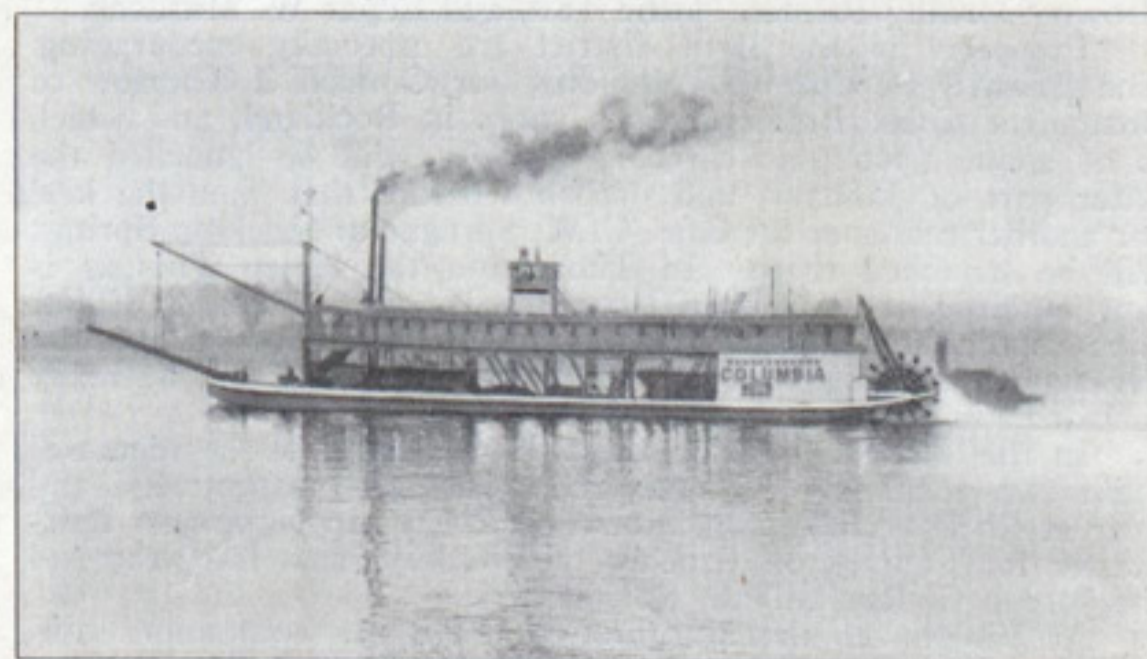
pattern, tandem-compound, two of the cylinders having 10 in. diameter and 6 ft. stroke of piston and two having 20 in. diameter and 6 ft. stroke of piston. They work a water wheel 9½ ft. in diameter that has fourteen buckets 18 ft. in length and 20 in. wide. The Columbia is provided with a D. M. Swain "doctor," having 3 by 9-in. plungers and one Riley pump for use as an auxiliary boiler feed and fire pump. Her steam pipes are extra heavy, and her exhaust pipes and fore and aft heaters of Pittsburg tubing with flanged ends and bolted-up and screwed joints are the first to be introduced on a lower-river packet. She is lighted throughout by electricity and has three powerful

searchlights, two on her head and one on top of her pilot house. An independent switch controls outside lights while the steamer is loading and unloading. A trip down the Ohio and the Missis-



RIVER STEAMER SENATOR CORDILL.

[Built at Howards' Ship Yard Jeffersonville, Ind.]



RIVER STEAMER COLUMBIA.

[Built at Howards' Ship Yard, Jeffersonville Ind.]

sippi on any of these steamers would be an experience which could not be had elsewhere. The journey is variable and full of delightful surprises.

FROM THE NEWPORT NEWS WORKS.

Newport News, Va., Jan. 20.—The new protected cruiser Charleston will be launched at the yard of the Newport News Ship Building & Dry Dock Co. Saturday and will be christened by the daughter of Mayor Rhett of the city after which the cruiser was named. Considerable interest is manifested in the event here and it is stated that a large delegation from Charleston will come to witness the launching. The South and North Carolina delegations in Washington and the national capital colonies from both states will be largely represented in the launching party. A delegation of naval officers will come from Washington and another from the navy yard across Hampton Roads. This will be the first launching of the year and will be followed some time in March by that of the monster battleship Virginia. The Virginia launching will probably be witnessed by the largest crowd that has ever assembled at a similar event in this country. Previous launchings here have been witnessed by as many as 30,000 on one occasion and 35,000 people on another, but both will be eclipsed by the Virginia crowd. It is confidently expected that there will be fully 50,000 people in the ship yard when the battleship named after this state is put overboard. Excursions will be run here from every section of the state.

The Charleston is one of three protected cruisers now building for the government, the others being the St. Louis and the Milwaukee. The principal dimensions are:

Length on load water line, 424 ft.; extreme breadth, 66 ft.; trial displacement, 9,700 tons; mean draught at normal displacement, 23 ft. 6 in.; indicated horse power, 21,000; speed, 22 knots; normal coal supply, 550 tons; coal bunker capacity, 1,500 tons. The armament will consist of fourteen 6-in. rapid-fire guns; eighteen 14-pounder rapid-fire guns; twelve 3-pounder rapid-fire guns; four 1-pounder automatic guns; eight 1-pounder rapid-fire guns; two 3-in. rapid-fire field guns; two 30-caliber machine guns and eight automatic 30-caliber guns. Details of armor protection are as follows: Main side armor, 4 in.; lower casemate armor, 4 in.; upper casemate armor, 4 in.; 6-in. gun protection, 4 in.; conning tower and shield, 5 in.; signal tower, 4 in.; splinter bulkheads, 2 in.; protective deck, 2½ inches. Twin-screw engines will be installed and there will be sixteen water-tubular boilers located in four watertight compartments. There will be four smokestacks towering 76 ft. 6 in. above the normal load water line. Accommodations will be provided for thirty-nine officers and a crew of 525 men.

Local shipping men are elated over the excellent showing made by Newport News in the coastwise coal shipments for the eleven months ending with November. This port was third on the list and ranked just ahead of Baltimore. Newport News shipped 1,610,541 tons of coal coastwise and Baltimore shipped 1,603,457 tons.

INCOMPETENT SEAMEN.

(From United States Consul Goding, Newcastle, New South Wales.)

One of the most important factors in the successful management of ships at sea is a crew of incompetent men. If the master is a reasonable man, supported by well-drilled and competent officers, together with a crew of well-trained seamen, a good vessel can weather almost any storm. At the present time ship owners find great difficulty, in many instances, in obtaining the services of each and all of these men who are qualified for their duties, although many are found in possession of good discharges. This is due, in a great degree, to ship masters, who frequently give able seamen's discharges to men who have spent but a brief period at sea. Frequently vessels reach this port the entire crew of which had never before seen salt water. They include laborers, doctors, lawyers, parsons, clerks, farmers, and coal miners. It is a fact that many men are shipped in foreign-going sailing vessels whose sea-going experience is of the most limited description.

In years gone by a long period of service was essential to gaining an able seaman's discharge, and such a document could be

relied upon as a guaranty that the possessor knew and could perform his work, but in those days men made long voyages and were paid off in the home port after completing a period of service often extending over two or three years. Today the practice is changed and the sailor, in the majority of cases, makes passages between ports only. He is either discharged or deserts, becomes stranded in some seaport, and is at the mercy of the crimp and the boarding-house keeper, who handles him as so much personal property. Consequent upon these conditions there is a continual interchange of discharges. The seaman who has been discharged for incompetency, or has deserted and has been ashore for some time, becomes a drug on some boarding-house master's hand. To secure him a vessel, a discharge is procured from a seaman with good credentials, recently paid off, and the incompetent man then goes to sea with a document indicating that he possesses all the necessary qualifications.

When seamen are in demand there is nothing to prevent a shore man from being substituted for a competent sailor, as these men are frequently put on board at the moment of sailing. It is manifest that the ship master has no opportunity of testing their ability until it is too late to make an exchange. Ship masters have



THE D. G. KERR, A LAKE FREIGHTER, AT MODERN ORE UNLOADING PLANT.

In this picture one of the largest freighters of the lakes is shown at an iron ore unloading dock with modern hoisting and conveying machinery for the operation of grab buckets hanging over her. The steamer Kerr and her sister ships, J. H. Reed, D. M. Clemson and James H. Hoyt, broke several of the cargo records on the lakes in the season of 1903. The Reed leads all the grain carriers with 271,000 bu. (8,130 tons) of wheat to her credit. The Clemson is next in the grain trade, having moved in one cargo 336,365 bu. (8,073 tons) of barley. The Kerr leads the soft coal carriers with 7,685 tons. The largest cargo of iron ore, 8,807 gross or 9,864 net tons, was moved by the steamer Wm. Edenborn of the Steel Corporation fleet. (Cut by courtesy of Acme White Lead and Color Works, Detroit.)

informed me that they frequently find it difficult to secure three men out of the crew who could be trusted with the wheel in bad weather or to perform other duties pertaining to able seamanship. To this condition of affairs disaster, loss of property, and sometimes loss of life can be traced. It matters not how staunch a vessel may be, or how well officered, there are times when an incompetent crew may bring about her destruction. By long experience it has been found wise to employ competent sailors as petty officers, but too often a preference is shown for a class of men whose chief qualification is a capacity to handle cargo and drive sailors. The prime cause of this condition of affairs is partly due to unprincipled boarding-house masters, who supply crews to vessels, and partly to masters who give an able seaman's discharge to incompetent men—many times to get rid of them. This last cannot be too strongly condemned, as it is both unfair to brother shipmasters and to the public; the first should be inquired into by the authorities.

Speaking for the ship owners, Alfred Windsor, president of the Boston Steamship and the Boston Towboat companies, said recently that subsidies granted to foreign vessels had driven them off the Atlantic ocean and they had transferred their ships to the Pacific, only to find that there they must compete with Japanese and English subsidies. He did not mind losing money for a year or two, he said, to build up a business, but the situation had now come to such a point that the American ships would either have to go out of commission or be transferred to foreign flags. "I'm through with it," he said.

Blast furnaces, steel works and rolling mills use great quantities of fire brick, fire clay, cement, etc., and this trade is looked after on a large scale by J. J. Shepard of Cleveland. The name Shepard has been familiar in this business line for nearly forty years. Large stocks, insuring prompt shipment, are carried by this Cleveland house.

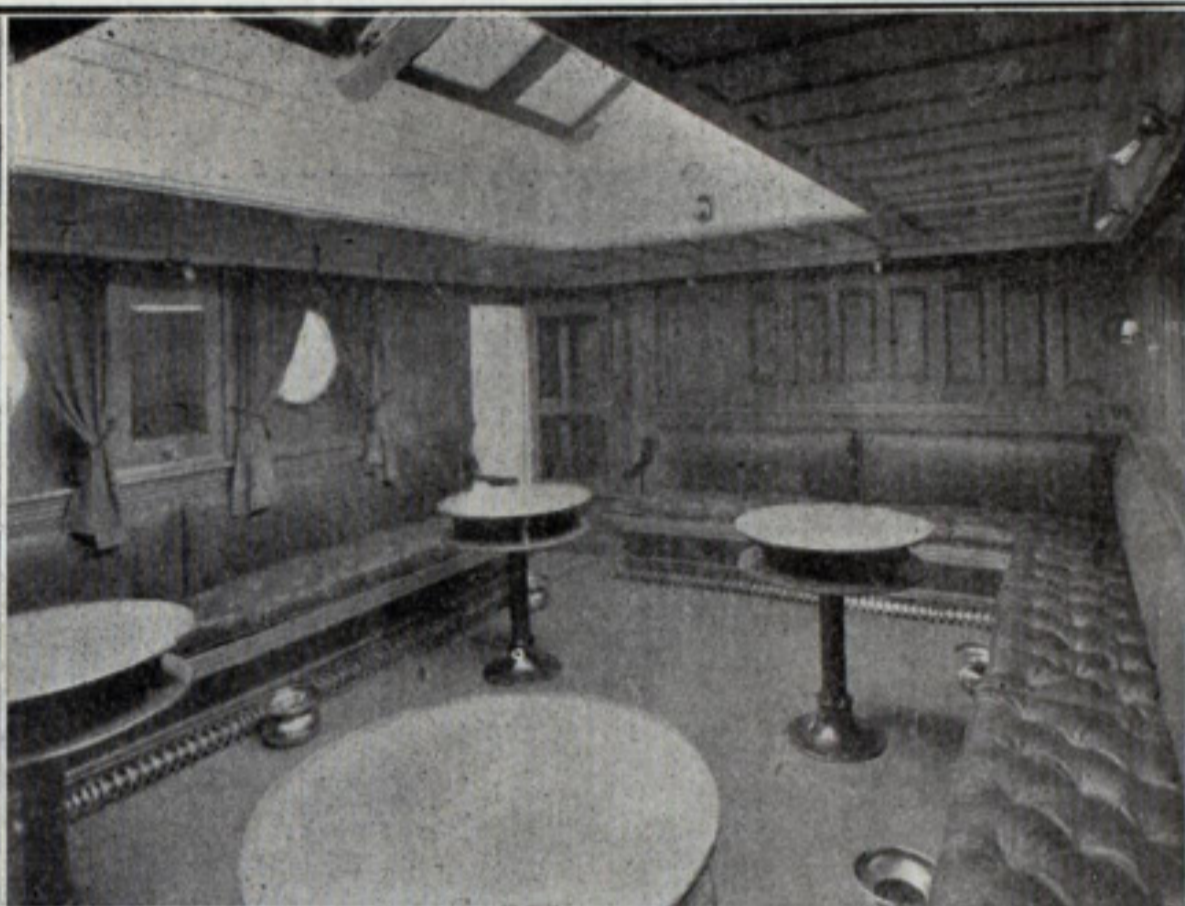
ACCOMMODATIONS OF SHAWMUT AND TREMONT.

Two years ago the Maryland Steel Co., Sparrow's Point, Md., built the Shawmut and Tremont for the Boston Steamship Co., a new shipping enterprise organized to engage in trade between the Pacific coast and the orient. The steamers, which are magnificent examples of their kind, were built purely as freighters, but after they had been in service for a short time it was found advantageous to incorporate passenger accommodations into them. This work was entrusted to Moran Bros. Co., Seattle, Wash., and how well the company has done can be seen by a glance at the accompanying photographs. The dimensions of the steamers are as follows: Length over all, 505 ft.; length between perpendiculars, 488 ft.; beam molded, 58 ft.; depth molded to main deck, 22 ft. 1 in.; depth molded to upper deck, 32 ft. 1 in.; depth molded to shelter deck, 40 ft.; draught, molded, 27

to fit it for the passenger trade. A new electric generator was installed to provide capacity for the extension of the lighting system, a donkey boiler was added with its connection to existing machinery piping and a large refrigerating plant with cold storage spaces was put in. In addition steel enclosures were built for galleys and pantries. New life boats were also added and the equipment was made ample for the transportation of troops. The plumbing fixtures installed are the highest class of Mott's products. The alterations outlined were made in the steamers in less than 120 days.

A Washington dispatch says that a final decision has been reached against the passage of a river and harbor bill at the present session of congress. The policy of the fewest possible appropriations during a presidential year determined the sacrifice

PHOTOS OF PASSENGER ACCOMMODATIONS INSTALLED IN SHAWMUT AND TREMONT BY MORAN BROS. CO., SEATTLE, WASH.



CAPTAIN'S ROOM.
SOCIAL HALL.

SMOKING ROOM.
FIRST-CLASS DINING SALOON.

ft. The steamers are of the three-deck type with shelter deck. At the load draught of 27 ft. their displacement is 16,950 tons. They have nine cargo hatches, giving access to an equal number of main compartments on the respective decks. As the steamers had no passenger accommodations whatever, except for the ship's personnel, the work of Moran Bros. Co. consisted of providing passenger accommodations for first and second class, involving a number of structural alterations and additions and the complete equipment of galleys and pantries. One of the additions is the pilot house on each vessel, located over the original wheel house, the wheel house having been fitted up as quarters for the captain, his original quarters in turn being transformed into passenger accommodations. There are two sets of quarters for first-class passengers, one in the forward house under the wheel house and surrounded by the bridge decks, the other in the midship house. In the forward passenger quarters is located the social hall, while the dining room with pantry and smoking room are a part of the midship passenger quarters. The new accommodations for the ship's personnel have been provided on the shelter deck in the midship house. The passenger accommodations throughout have been made large and airy, special attention having been given to lighting, ventilation, lavatories and baths. The main dining saloon, smoking room and captain's quarters have been finished in choice hardwoods, polished in their natural colors. These spaces have been fitted with artistic ornamental electric light fixtures.

The equipment of each steamer was considerably increased

of the river and harbor bill. House and administration reached the conclusion last summer that this measure should be choked off. The chances for the legislation looked brighter when Congressman Burton returned from his European trip. At first he was hardly ready to accept in any part the dictum of the party chiefs, realizing as he did the urgent necessity for many of the improvements urged. Then he hoped that it would be possible to secure a compromise in the form of a modified bill. To this end many conferences have been held between Mr. Burton and the president, Secretary Root, Speaker Cannon and others prominent in administration councils. Mr. Burton did not lose hope until quite lately, but members urging river and harbor projects who have seen him within the last few days have been given to understand that he has finally accepted the verdict against such legislation as final and necessary. There is to be, it is understood, a small appropriation made to cover maintenance of existing works where this is absolutely indispensable and a loss to the government through deterioration would accrue without it.

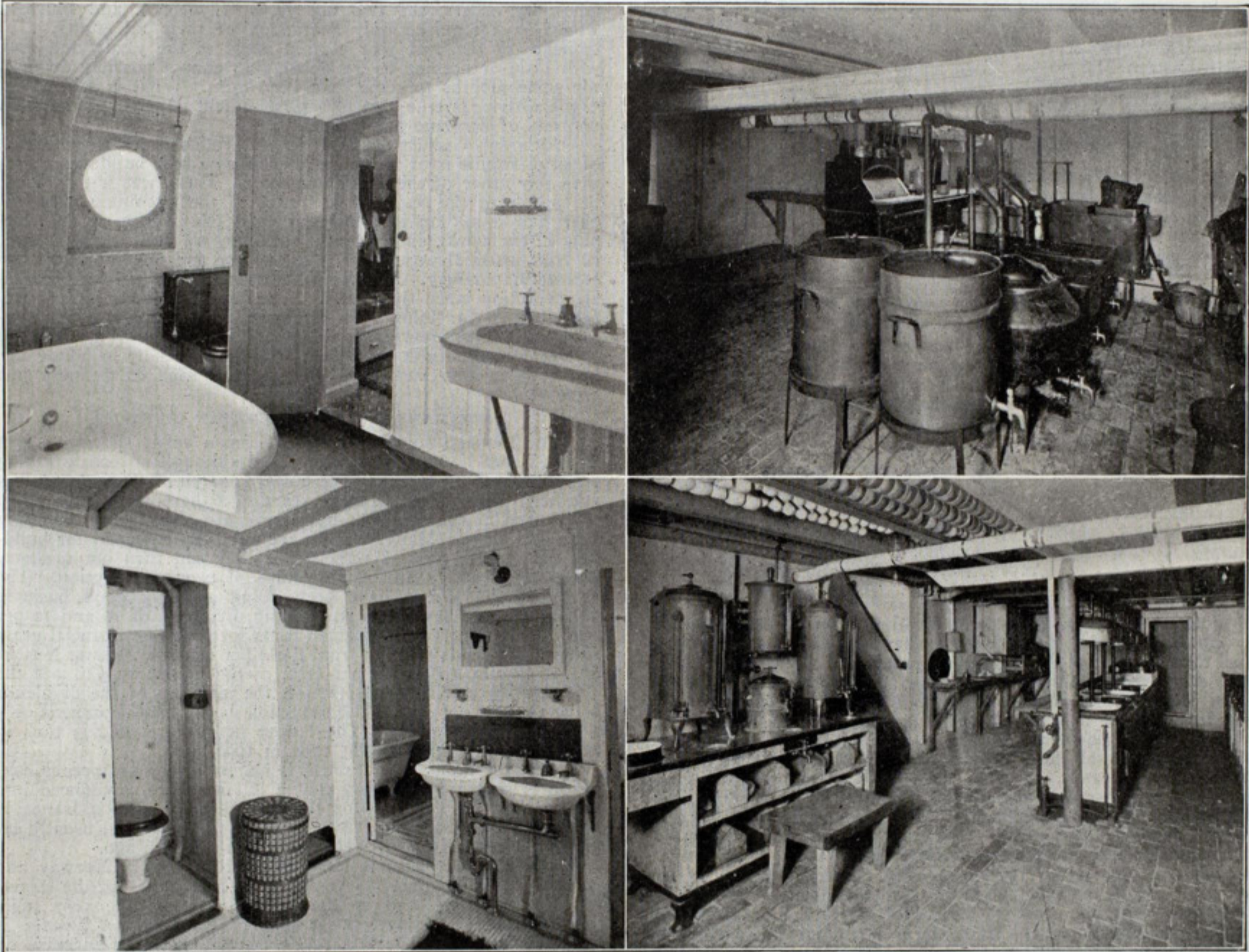
Edward Ramage of 267 Wellington street, west, Toronto, who has a plant for repairs to steel and composite vessels, is at present engaged at the government dry dock, Kingston, in carrying out a repair job on the Niagara Navigation Co.'s steamer Chicora that will not be finished until April 1. About 120 shell plates are being taken off. The job involves also the removal of some stern plates and straightening of the stern, as well as extra belt frames, and other work around the engine room.

World's Ship Building in 1903.

A summary of the world's ship building in 1903 is now at hand. Much of the information is from the Glasgow Herald, a well-known authority on the subject. The number of vessels launched all over the world during the year was 2,441, with tonnage aggregating 2,679,531 and indicated horse power of 2,352,485. In 1902 there were 2,393 vessels of 2,715,670 tons and 2,017,254 H. P. It will be seen, therefore, that the number of vessels is more by forty-eight, that the tonnage is less by 36,139, and the indicated horse power greater by 335,231. Considerably more than half the tonnage was produced within the United Kingdom, Eng-

		1902.	
Scotland	404	566,553	510,808
England	937	891,109	669,368
Ireland	27	158,573	107,100
United Kingdom totals		1,616,235	1,287,276
Colonial	86	24,700	10,815
Foreign	939	1,074,735	719,163
Grand totals	2,393	2,715,670	2,017,254

PHOTOS OF ALTERATIONS MADE IN SHAWMUT AND TREMONT BY MORAN BROS. CO., SEATTLE, WASH.



STATEROOM BATH.
LAVATORIES AND BATH ROOMS.

MAIN GALLEY.
LOWER PANTRY.

land turning out 871 vessels of 766,295 tons, Scotland 362 vessels of 484,853 tons and Ireland twenty-five vessels of 158,482 tons. With the exception of the United States, no foreign country launched an aggregate tonnage equal to the Clyde alone, which built during the year 277 vessels of 446,869 tons. There was a decrease on the Clyde, the Tay, the Dec, the Tyne, the Wear, Tees and Hartlepoons, the Thames, in Ireland, Germany, France and Holland; and an increase on the Forth, the Mersey, the Humber, the English channel, in the British colonies, the United States, Russia, Norway and Sweden, Italy, Austria-Hungary, Japan, Denmark, Belgium and China. The following summary shows the position of the United Kingdom as compared with other countries in the 1903 output:

	Vessels.	Tons.	I. H. P.
Scotland	362	484,853	497,396
England	871	766,295	727,221
Ireland	25	158,482	128,450
United Kingdom totals	1,258	1,409,630	1,353,067
Colonial	96	37,225	12,966
Foreign	1,087	1,232,676	986,452
Grand totals	2,441	2,679,531	2,352,485

The principal ship building districts in Britain compare with the principal foreign countries as follows:

	Vessels.	Tons.	I. H. P.
United States	188	493,144	324,290
The Clyde	277	446,869	455,221
The Tyne	149	262,794	254,405
Germany	271	261,003	197,225
The Wear	60	189,339	137,465
Tees and Hartlepoons	67	171,304	89,640

In 1902 the order of the districts and countries was the Clyde, the Tyne, the United States, Germany, the Wear and the Tees and Hartlepoons.

Harland & Wolff, Belfast, Ireland, lead the way with an output higher by far than anything produced in one year by any other company. Of course the tonnage of the American Ship Building Co. of Cleveland with its seven yards on the great lakes is higher but the American company is a combination of seven ship yards and is not a single concern like the Harland & Wolff company. It is also true that the bulk freighters of the lakes, running up into a large tonnage in the aggregate, cannot well be compared with such vessels, for instance, as are built at the Harland & Wolff works. Messrs. Harland & Wolff have in their time floated twenty-four vessels of an average of 14,643 tons each, whereas all other

British firms have floated only six vessels of an average of 13,550 tons. Their output last year was 110,463 tons, an aggregate in which is included only eight vessels. The firm's highest figures previous to this year were those of 1901, when the tonnage was 92,316. In engineering, too, Messrs. Harland & Wolff take first place with a total of 100,400 I. H. P. This is a double record.

The leading half-dozen ship building firms arranged according to their tonnage, and accepting the American Ship Building Co. as one concern, are:

	Vessels.	Tons.
American Ship Building Co. (seven yards)....	46	166,288
Harland & Wolff	8	110,463
Swan, Hunter & Wigham Richardson.....	22	61,589
John Brown & Co.	6	55,152
Armstrong, Whitworth & Co.....	13	48,740
Russell & Co.	13	45,810

In 1902 the order of the first six firms was: The American company, Harland & Wolff, Workman, Clark & Co., Swan & Hunter, Russell & Co. and Armstrong, Whitworth & Co.

In marine engineering the leading firms in 1903 are:

	I. H. P.
Harland & Wolff	100,400
North-Eastern Marine Co. (two shops).....	89,275
Wm. Cramp & Sons Co.	67,100
American Ship Building Co. (four shops).....	63,696
John Brown Co.	61,000
Richardson, Westgarth & Co. (three shops).....	55,040

In 1902 the North-Eastern Marine Co. was first, and was followed in their order by Richardson, Westgarth & Co., R. & W. Hawthorn, Leslie & Co., the Wallsend Slipway Co., Harland & Wolff and the American company. The indicated horse power of the two leading firms in 1903, it may be noted, is in each case a record for the company.

SIX LEADING MERCHANT VESSELS OF THE YEAR.

For the third consecutive year Harland & Wolff have four vessels in the largest half-dozen launched. In 1901, for that matter, they had five. In 1902 the other two boats were the Kaiser Wilhelm II., built by the Vulcan Co., Stettin, and the Cunard liner Carpathia, built by Swan & Hunter, Wallsend-on-Tyne. In 1902 the smallest vessel of the six was of 12,231 tons. In 1903 the smallest is of 15,378 tons.

Vess-l.	B. T. Tons.	Builders.
Baltic	23,763	Harland & Wolff.
Minnesota	21,000	Eastern Ship Bldg. Co.
Dakota	21,000	Eastern Ship Bldg. Co.
No. 353	16,780	Harland & Wolff.
No. 354	16,780	Harland & Wolff.
Republic	15,378	Harland & Wolff.

Just when it was being said that the steamship had reached its utmost profitable development, when engineers were stating it as their belief that no further improvements could be made on the steam engine that would extend to any appreciable extent its range of economical working, events once more proved that in ship building, as in most other things, there is no finality. A year ago the marine steam turbine was believed to be passing out of the experimental stage and becoming a practical agent in the propulsion of vessels. In one short year it has ceased to be spoken of as an experiment and to be referred to as a mechanical curiosity, interesting, no doubt, but impracticable, and at the present moment there are at least half a dozen large steamers under construction for turbine motors, two of them Allan liners, intended for the regular Liverpool to St. Lawrence trade. If, as seems certain, it is also decided to fit this form of propelling mechanism into the proposed new Cunarders, it may safely be reckoned as something that has come to stay, and that will mark a stage in the construction of ships as distinct as that indicated by the introduction of the triple-expansion engine. That it will enable high speed to be attained at relatively less expense is only one of the possibilities of the near future. When its adaptability to slow-going "tramp" steamers is also proved—as it will no doubt be—its field of usefulness will be immensely widened and that of the reciprocating engine immensely narrowed. The enterprise of the Allan Line in ordering two turbine steamers of comparatively low speed has set ship owners generally thinking, and already some of them have made careful inquiries into the matter. Before another year is out we will probably have heard of the placing of orders for turbine steamers for general trading purposes. Already its suitability for warships is practically acknowledged. It will be proved if the British cruiser Amethyst, now completing at Elswick, is as successful as Messrs. Parsons, who are fitting her with turbines, believe she will be.

GERMANY IS BRITAIN'S CHIEF COMPETITOR.

Germany continues to be Britain's most serious competitor, as there, with men who work longer hours and more steadily at lower wages, builders are able to compete under favorable conditions. There were several cases last year where a contract was lost to a Clyde builder because a German firm was able, not only to quote a price as low as the Scotch, but could fix a definite date for delivery earlier than that suggested by the Clyde builder, the latter having to take into account possible stoppages of work. Germany must in the natural order of things be able soon not only to compete with Britain in neutral markets, but to claim a small share of the building of British ships. This share cannot be so large as to cause British ship builders any serious consideration,

since they continue to build cheaper than Germany, or, for that matter, than any foreign country. Whether they would be able to build cheaper if cheap continental steel were kept out of British markets is quite another question. Builders themselves do not believe they would, and they are therefore—as builders, decidedly opposed to the prevention by tariffs of "dumping." British ship builders have frequently within the past year or two bought from Germany steel castings and forgings at prices 30 per cent. below similar goods of English make, and this has enabled them to obtain orders for ships which they would otherwise have lost.

POOR OUTLOOK IN SHIP BUILDING FOR 1904.

This time last year it was the general opinion that the prospects of the Clyde ship building trade were not such as to encourage high hopes for its immediate future. This year the outlook is decidedly worse. There is a great deal less work on hand, a great many more idle men, and a good many fewer orders on the books of the ship builders. All over the district empty berths may be seen, and there are quite a number of yards where there is only one vessel on the stocks, and that far advanced, while several are absolutely devoid of new work. Were it not for their admiralty orders, the two big yards, Clydebank and Fairfield, would have required only a fraction of their full staffs. The launches of the past year cleared many of the yards, and now, with little or nothing to lay down, they cannot possibly do more for some months to come than keep open. What is said of the Clyde district is true also to a great extent of most of the other districts of Scotland and England.

Although Canada does not as yet produce very many vessels of large size, it is of far more interest as a ship building country than any other of the British colonies. There was a time when the people of the seaboard provinces of the Dominion, then not over half a million in number, owned one-twelfth of the shipping of the world, and not only owned it, but built it and manned it. The material was found in the spruce and oak and birch forests of the country. But the industry has undergone a remarkable evolution since those days. The big ship yards have disappeared from St. John, New Brunswick, and Prince Edward island. Three or four yards in Canada equipped for the building of steel vessels are doing a fair business, especially in lake trade, but even in this line there is a marked spell of dullness just now.

IN GERMANY AND OTHER EUROPEAN COUNTRIES.

The tonnage launched by the German yards shows a slight decrease, but nothing of moment, and although no epoch-making vessels have been launched the onward march of the industry has not been interrupted. Thirty years ago there were only seven ship yards in the country; now there are about sixty, counting large and small. Many of them are not fully equipped for building the largest type of vessels, but they can turn out ordinary sea-going steamers and sailing ships of every description. The yards on the Weser have been doing specially good business during the past few years and paying dividends of 10 and 12 per cent. The reports of the German firms for their last financial years showed dividends ranging from the 4 per cent. of Messrs. Nutsche & Co., Stettin, to the 14 per cent. of the Flensburg Co. and the Tecklenborg yard at Geestemunde, the majority of the dividends being above 9 per cent. The reduction in the year's output is only a matter of 8,752 tons. The output figures are 261,003 tons in 1903, compared with 269,755 tons in 1902.

That the industry in France is not in a very prosperous condition is shown by the fact that a bill has been introduced into the chamber of deputies for the providing of 250,000 francs in aid of the unemployed at Havre. Out of the 5,000 men usually engaged there nearly 3,500 were idle about a month ago.

The year has been a fairly prosperous one in Norway and Sweden. A fair number of vessels have been built, but the largest is not 4,000 tons, and so the aggregate cannot be very high. The number of sailing vessels built in Norway and Sweden is comparatively few, but this year's returns show an increase on those of last year, when there were no sailers whatever.

The sailing ship retains, perhaps, a better hold in Italy than in any other country. In 1903 the number of such vessels built in Italian ship yards was much larger than in any other recent year. Several of the largest firms built practically nothing else, and all down the list the words bark, brigantine and schooner predominate. The tonnage launched, 52,380, makes a total very near that of 1902.

PROTECTION OF LIFE AND PROPERTY AT SEA.

During the past year noteworthy advancement has been made in way of appliances and methods for safeguarding life and property at sea, which is a matter worthy of the best efforts of mankind. Several new life boats, rafts and floats have been invented and placed on the market, the latest in this line being the collapsible life boat manufactured by Lane & De Groot of Long Island city, New York, which has many features to recommend it, notably its wonderful buoyancy and hence great carrying capacity, while requiring far less room for storage than the ordinary boat. Among other life boat and raft builders may be mentioned D. Kahnweiler's Sons of New York city and Thos. Drein & Son, Wilmington, Del., who keep abreast of the times, as manifested by the favors bestowed upon them by ship owners and ship masters.

But while life boats and rafts are most essential to the welfare of a ship's crew and passengers, in case of need, and under no circumstances can be dispensed with, there has—thanks to the genius of man—been preventives for disasters at sea, discovered and invented which are intended to make the necessity for the use of life boats and rafts less frequent; discoveries which have

amply demonstrated the truth of the adage "an ounce of prevention is worth more than a pound of cure." In this class I would cite the Pintsch gas lighted buoys, which have been adopted by the United States, French, Russian, German and English lighthouse departments, the value of which is attested by the steady increase of orders being received for the buoys by the Safety Car Heating & Lighting Co. of New York city. It naturally occurs that one of these buoys once placed, to give the mariner warning and enable him to navigate his craft free from rocks and shoals, begets on the part of masters and pilots a desire for more such safety guides, and upon request to the government one after another is being installed until it is hoped that it will be but a short time until every danger point of the ocean coasts and the lakes will be marked by them, to the end that even the novice may be enabled to steer his boat clear of danger. As the light of these buoys is steady and brilliant, burning from eighty to 365 days and nights without attention, and can in some cases be seen for a distance of six miles, it is little wonder that they are coming more and more into use as safety guides to ships.

Yet, with all provision of life boats and safety lights there still remained something more to be done to insure safety to ships and their cargoes; something that would insure a ship at sea from the dreaded demon fire, as of all calamities none can exceed in terror that of a fire at sea. To provide a preventive of such disasters has long enlisted the best efforts of scientific and practical men, but not until the discovery of Clayton gas was anything found to meet the requirements. To Mr. Thomas A. Clayton—after whom it is named—the world is indebted for the discovery of this gas, which after repeated tests in Europe and America, and on the high seas, has been found not only most efficient in extinguishing fire but equally as serviceable in the prevention of contagion, ridding vessels and warehouses of vermin from the noisome cockroach and the disease-breeding bed bug and mosquito to the plague-conveying rat; killing the germs of disease and making a ship's hold and cabins as wholesome as the best-kept private residence in the land, which is surely a condition much to be desired.

Readers of the Marine Review will no doubt recall the fact that I have already written at more or less length on the virtues of this gas as a preventive of fire, vermin and plague on shipboard, and in again referring to it I would state that no apology from me is necessary, as I believe anything calculated to save life and property, quell human fear and avoid human suffering is worthy of all possible publicity. In the language of the street "it's a good thing, push it along."

While the Clayton gas was at first intended for the suppression of fire on board ships and for their fumigation, its field of usefulness has expanded until it is now recognized as useful on land as on sea. It has many characteristics which recommend its use. For instance, a ship captain who was sailing a coal-laden vessel in the tropics reported that the temperature in the hold went up to 95°, which he considered a danger point, in view of the liability of his cargo to spontaneous combustion. He set the Clayton gas apparatus, with which his vessel was supplied, in operation, pouring the gas into the hold, and soon reducing the temperature to 82°, or below the danger point. Several cases are cited where fire has quickly been subdued by the gas and many where ships have been entirely cleared of vermin by its use.

Probably in no country on earth has it been put to such varied uses as in France, where every vessel arriving from a plague infested port is thoroughly fumigated by Clayton gas before any of its cargo is permitted to be removed. It is also used extensively on land, especially in fumigating and disinfecting hospitals, etc. Among these may be named the Barracks of the Invalides, the Saltpetriere hospital, the Bicetre hospital and the Vangirard college, Paris. Even Russia has recognized its value and a college and chapel in that city has been disinfected. I might cite many more examples of the efficiency of this gas, but space and time forbids. Therefore, I will refer all who may desire information regarding it to The Clayton Fire Extinguishing & Disinfecting Co., 11 Broadway, New York city, from whom detailed information may be obtained.

GEO. W. RAMAGE.

VICTOR NON-CORROSIVE SILVER METAL.

After years of thorough trial, the Victor Metals Co., East Braintree, Mass., is urging the use of their metal, known as Victor non-corrosive silver, for various uses on board ship, as they are fully satisfied that it is especially suited to this line. The metal is claimed to fulfill the requirements of being absolutely salt-water proof and non-tarnishing, as well as acid proof. Besides, the metal has a tensile strength of 53,280 lbs. to the square inch, with an elongation of 15.7 per cent. in 3 in., as per government test. In addition to possessing these qualities, it is claimed that the metal will, when polished, take a high finish like silver. No zinc protection is necessary where propellers, condensers, sea connections, etc., are made of the Victor Non-corrosive silver metal, nor is there any danger from the bilge water, if valves, pipes, fittings, pumps, etc. are made of same. For interior fittings which are constantly in use, as, for example, plumbing fixtures, hardware trimmings, etc., this silver metal is of importance on account of its lasting and non-tarnishing qualities, whereby it not only saves the expense of replating such fittings, but also the time of cleaning and polishing necessary with other metals. On deck, particularly on yachts and launches, where in the past a great deal of brass and bronze have been used, the silver metal is now being adopted and a great number of both large and small vessels have been fitted out with this metal for all such fittings as cleats, chocks, ring and eye bolts, rail and awning stanchions, skylight and side-ladder

fittings, air ports, pin rails, mast bands, gaff jaws, chain plates, steering gears, windlasses, engine telegraphs, searchlights etc. Any of our readers wishing further information can obtain such by applying to the general manager of the company, Eric H. Ewertz, 29 Broadway, New York city.

LEBANON CHAIN WORKS.

Probably no chain works in this country is better known to the ship builders, or in shipping lines generally, than the Lebanon Chain Works of Lebanon, Pa., which was sold some time ago to the Standard Chain Co., but again turned back on purchase a few weeks ago to Mr. Eli Atwood, who was the moving spirit in the old company. The Lebanon plant is the largest single chain plant in the country and its equipment is modern in all respects. Up-to-date appliances enabled these works to turn out, not long ago, the large 33-16 in. steel link cable chain which was furnished to the Eastern Ship Building Co. of New London, Conn., for the Hill Pacific liners and which attracted so much attention. Facilities at these works are such that very large orders for chain of standard or special dimensions from 1/4 in. to 3 1/2 in. diameter iron may be handled without difficulty. They not only carry large quantities of chain in stock, standard dimensions, but with the arrangement of their plant and number of chain fires are in position to meet hurried demands for special-dimension chain, such as will fit English windlasses and meet other odd requirements. They have a testing machine (registered by Lloyd's and other ship classification bureaus) that is of 600,000 lbs. capacity. The only other machine of that size in this country is the one at Charlestown, owned by the government. The output of the works from its own iron includes high-class ship's cables, steel and iron dredging chains, crane, mining and rigging chains, chains for differential pulley blocks, all sizes of machine chains, etc.

PROGRESS OF WORK ON NAVAL VESSELS.

Herewith is the latest summary from the navy department showing progress of work on vessels under construction in different ship yards of the country:

Name.	Building at	Degree of completion. Per Cent.	
		Dec. 1.	Jan. 1.
Battleships.			
Missouri	Newport News Co.	99.7	99.9
Ohio	Union Iron Works	83.5	84.5
Virginia	Newport News Co.	50.4	52.5
Nebraska	Moran Brothers Co.	33	35
Georgia	Bath Iron Works	40	42.5
New Jersey	Fore River Ship & Engine Co.	48.9	49.43
Rhode Island	Fore River Ship & Engine Co.	48.8	50.61
Connecticut	Navy yard, New York	24.7	26.7
Louisiana	Newport News Co.	31	34.5
Vermont	Fore River Ship & Engine Co.	1	2.76
Kansas	New York Ship Building Co.	2	2.6
Minnesota	Newport News Co.	8	12
Armored Cruisers.			
Pennsylvania	William Cramp & Sons	63.2	64.9
West Virginia....	Newport News Co.	67.3	70.5
California	Union Iron Works	48	51
Colorado	William Cramp & Sons	67.4	69
Maryland	Newport News Co.	63.1	65.4
South Dakota....	Union Iron Works	44.5	47
Tennessee	William Cramp & Sons	12.9	15.1
Washington	New York Ship Building Co.	9.7	12
Protected Cruisers.			
Denver	Neafie & Levy	98	98
Des Moines	Fore River Ship & Engine Co.	96	97
Chattanooga	Lewis Nixon	72	72
Galveston	Wm. R. Trigg Co.	69	70.5
Tacoma	Union Iron Works	96.5	99
St. Louis	Neafie & Levy	34.8	36.2
Milwaukee	Union Iron Works	38.5	41
Charleston	Newport News Co.	55.2	56.9
Gun Boats.			
Dubuque	Gas Engine & Power Co.	15	20
Paducah	Gas Engine & Power Co.	13	16
Training Ships.			
Cumberland	Navy yard, Boston	7	12
Ontrepid	Navy yard, Mare island	0	5
Training Brig.			
Ecker	Navy yard, Portsmouth	3	6
Torpedo Boats.			
Stringham	Harlan & Hollingsworth	93	93
Goldsborough ...	Wolff & Zwicker	99	99
Blakely	Geo. Lawley & Son	99	99
Nicholson	Lewis Nixon	99	99
O'Brien	Lewis Nixon	98	98
Tingey	Columbian Iron Works	100	100
Steel Tugs.			
Pentucket	Navy yard, Boston	96	100
Sotoyomo	Navy yard, Mare island	95	98

The Ottawa Forwarding Co. is building a steamer in the canal basin, Ottawa, Ont., for its river trade. It is also having extensive repairs made on a number of its tugs.

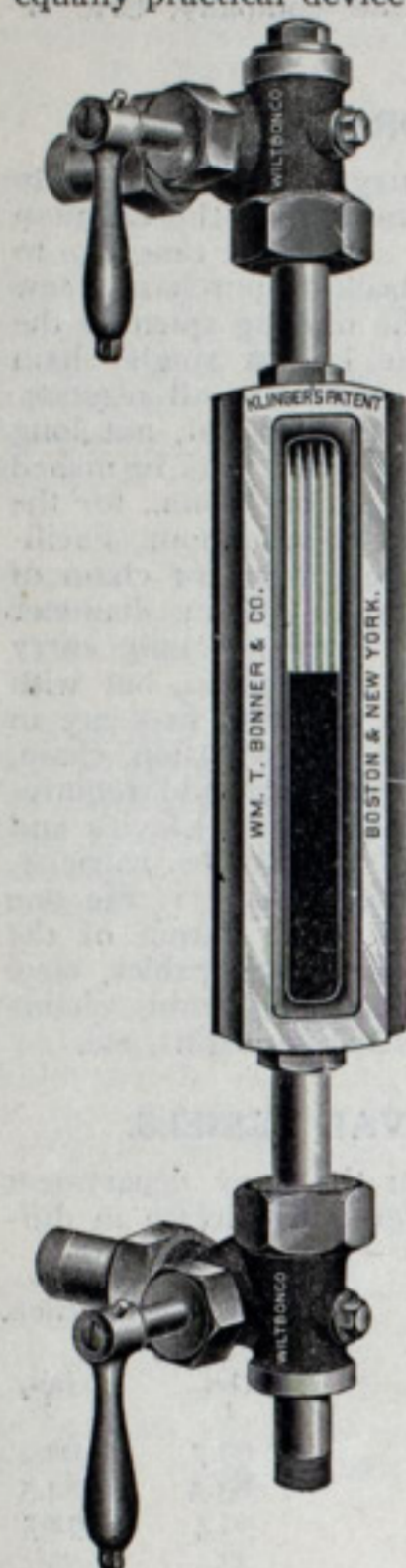
KLINGER REFLEX WATER GAUGES.

The Klinger gauge, illustrated herewith, is a very novel but equally practical device for indicating the level of water in boilers and reservoirs, which Messrs. Wm. T. Bonner & Co., Boston, are furnishing for many of the ships in the United States navy and for merchant ships and large stationary plants. These gauges are capable of withstanding very high pressures, as the glasses are enclosed in such a way that even if they should break, a very rare occurrence, the effect would be not worse than an ordinary leak, and very little inconvenience and no danger would result.

The novel feature of the Klinger glass is the extreme contrast of color shown for steam and water, the latter appearing black as ink while the steam space shines with a silvery lustre. This feature alone is of great importance on board ship, where the stoker or water tender often has many sudden demands upon his attention and an uncertain water level is liable to be misinterpreted with more or less disastrous results.

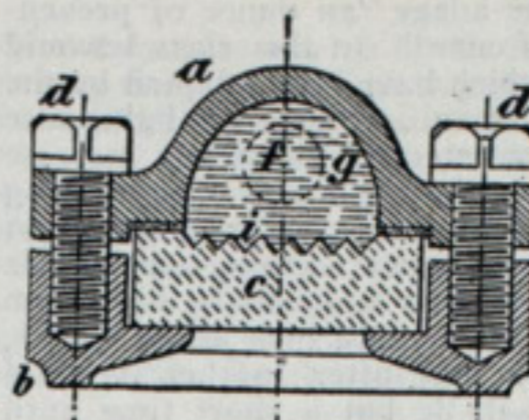
The larger of the accompanying cuts faithfully represents the contrast of color between the water and steam, this effect being obtained by the prismatic grooving of the inner surface of the observation glass *c*, as shown in smaller cut. This glass is clamped tightly between the back trough-shaped plate *a*, forming the steam and water chamber *f*, and the front cover plate *b*. The prismatic grooving of the glass tends to reflect the rays of light until water enters the chamber *f*, filling the grooves and rendering the glass transparent. The black background of chamber *f* then becomes plainly visible.

The Klinger reflex water gauges and Wiltbonco mountings have already been supplied for quite a number of the torpedo destroyers, cruisers and battleships of the United States navy, and are also being quite generally adopted in the large power stations throughout the



Klinger Gauge,
single-lever type.

country. In a page advertisement in this issue Messrs. Wm. T. Bonner & Co. illustrate some additional types of gauges and



Cross section of gauge.

mountings, and for those who may require special mountings for any kind of service, the manufacturers will gladly supply drawings, specifications and other information. Printed matter of a very interesting kind regarding these gauges may be had for the asking. The Boston address of the company is 53 State street and the New York office 141 Broadway.

Mr. George S. Potter of Buffalo announces that the law firm of Potter & Wright having been dissolved, he has removed his law office to 35-36 Dun building, 110 Pearl street, and has formed a co-partnership with Mr. Meredith Potter for the general practice of the law, under the firm style of Potter & Potter. Mr. George S. Potter was for many years a member of the well-known firm of Williams & Potter, marine lawyers, in Buffalo. Since the death of Mr. Williams, some six years ago, Mr. Potter has been the senior member of the firm of Potter & Wright, which being dissolved on Jan. 1, 1904, he formed a partnership with his son Meredith, taking up offices in the Dun building, as noted.

A new steamer for the excursion traffic between Catalina Island and San Pedro, Cal., is being built by the United Engineering Works, San Francisco. The steamer is to be 185 ft. long, 32 ft. beam and 14 ft. deep. She will be named San Salvador.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the
Highest Grade for Locomotive,
General Machinery and Shipbuilding
Work.

Subject to U. S. Government, Lloyds, Railroad and
Other Highest Requirements.

Seaboard Steel Casting Co.,
Chester, Pa.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (SEPTEMBER, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	-	-	-	-	-	-	-	-	355,560 H. P.
English Royal Navy	-	-	-	-	-	-	-	-	929,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	-	227,500 "
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	56,700 "
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	18,500 "
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-	
Total Horse Power of Boilers in Use	-	-	-	-	-	-	-	-	1,850,860

Société Anonyme des Etablissements Delaunay Belleville

CAPITAL: 6,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine

BYRAM'S AUXILIARY RUDDER.

The auxiliary rudder illustrated on this page is the invention of Mr. Theodore P. Byram, Detroit, Mich., who has given a great deal of study to the important subject of loss of life and property through accidents to the steering gear of vessels. It is, of course, well known that great losses on account of steering gear accidents, the rudder itself sometimes being carried away, are frequent, and Mr. Byram is right in saying that strange as it may appear little has been accomplished along the line of auxiliary rudder apparatus—something to save the ship itself—while for years all kinds of safeguards have been introduced in other forms of life saving apparatus.

The special claim made for this auxiliary rudder by the inventor is that it may be applied to any vessel and when so applied may be hurriedly brought into service in the event of the main rudder becoming disabled. The device will be best understood by referring to the illustration. Briefly it consists of two pockets in the vessel's stern, into which are placed two auxiliary rudders and frames. As these rudders are needed they are projected outward by racks and pinions, the stem of rudder engaging with fixed auxiliary rudder posts, when it is ready for action in the usual manner. Mr. Byram is of the opinion that with the assistance of an ordinary crew working on both sides of the apparatus not more than 10 minutes would be required to have both auxiliary rudders projected and ready for service. He also lays stress on the point that "when these rudders are not in service they are completely withdrawn into the hull of the vessel, and therefore cannot possibly be any obstruction while navigating rivers or contracted harbors; neither could they possibly be endangered by close quarters."

Capt. W. J. Smith of the Seattle Nautical College says in a letter to Mr. Byram: "I have read with much interest a description of your proposed jury rudders, and am strongly impressed with the absolute necessity for such a device on ocean and coastwise steam vessels. All men engaged in shipping interests will heartily support and indorse a contrivance by which a ship at sea can still be under control, even though her permanent rudder is carried away."

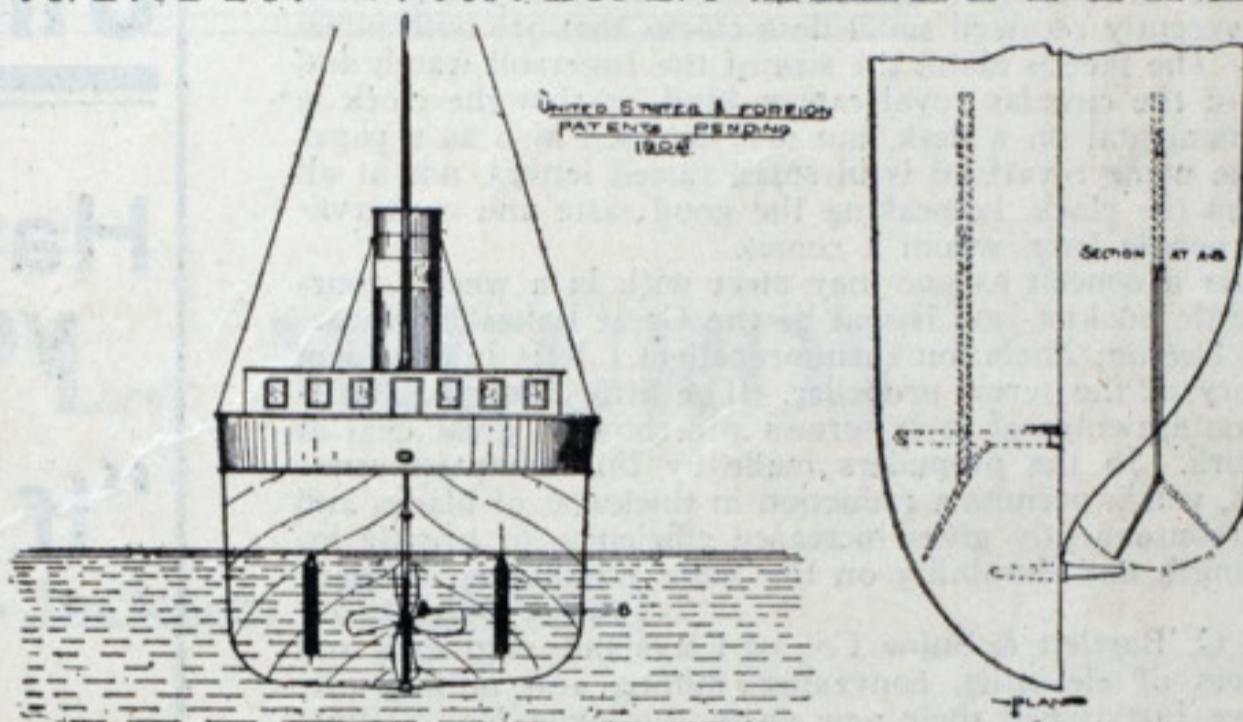
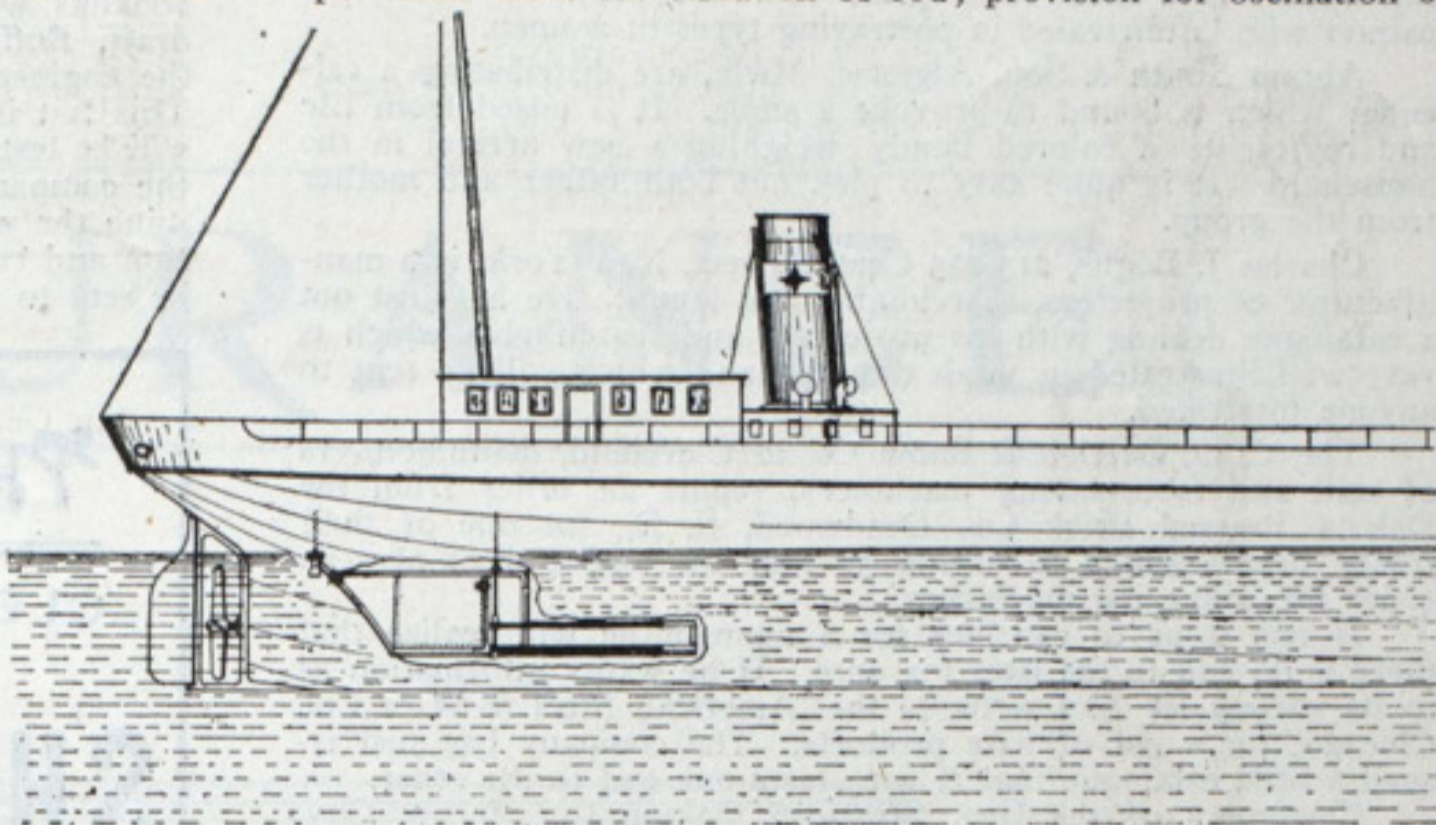
A well-known Cleveland vessel master says of the device: "I consider the auxiliary rudder which you have invented one of the best things of the day. In the course of a long and varied career I have had brought home to me on several occasions the helplessness of a ship without a rudder. No matter what efficiency there is in the other appliances with which a vessel is supplied, it seems they are as nothing when anything happens to prevent a proper working of the rudder. An auxiliary rudder such as you have invented seems to fill a long felt want, and I know that in the course of my career as master of steamers, I have often felt that the life and property in my charge would be more secure had I something I could depend upon to properly steer the ship in the event of anything happening to the rudder. All that is necessary for you to do to make your invention a success is to properly demonstrate to the seafaring public that in the case of need it can be got into working position in a very short space of time. You will understand that we all look upon the law of contingency. A rudder may run along for years without an accident, but that is no proof that it will continue to do so. Conditions may arise at any moment beyond the control of ordinary means—disaster and death may follow. Accidents involving the loss of life and property through the inefficiency of steering apparatus are of almost daily occurrence on the waters of the world. The efficiency and safety of a boat are increased in ratio as the possibilities of accidents are removed. It is obviously, then, an act of precaution and wisdom to apply such means as will make such accidents impossible. The main thing, as I have before stated, for an appliance of this kind, is that it should be efficient in economy of operation and maintenance and finally to furnish that quick and absolute security against accidents of this nature which can be had by no other means."

Mr. Byram is about to undertake the manufacture of this device and will be pleased to correspond with anyone interested. His address in Detroit is care of the Century Supply Co.

The Lunkenheimer Co., Cincinnati, makers of brass and iron steam specialties, report that owing to the unprecedented and growing demand for their specialties, they have again greatly increased their facilities and are now in position to guarantee reasonably-prompt shipments. They also report through their foreign branches an increase in orders.

The N. L. Hayden Manufacturing Co., 172-182 West Locust street, Columbus, O., has just issued a sumptuous catalogue which contains more general information on metallic packing and safety valves than any publication that has recently come to note. Especial emphasis is laid upon the Downing metallic packing, the Tippet piston safety valves and the Hayden relief valves. The Downing metallic packing is designed to provide all the essentials found necessary in a successful packing such as: The proper

designs for any pressure or vacuum; the very best of workmanship; the proper materials to insure durability; the design that reduces friction and wear to a minimum; perfect joint made on rod; provision made for vibration of rod; provision for oscillation of



BYRAM'S AUXILIARY RUDDER.

rod; provision for out-of-line movement of rod. The packing is not affected by high temperatures. It is perfectly reliable under high speeds and is designed for high pressure and heavy duty.

Steamships, Government, Revenue and Lighthouse Vessels, Yachts and Boats of all descriptions

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FURNISHINGS

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Covering everything that can possibly be required in

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**Galley Ranges,
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Detailed work requiring special plans or sketches carried out by expert operators.

We gladly submit Estimates free of charge.

PROMPT DELIVERY OF GOODS.

Address

CONTRACT DEPARTMENT,
SIEGEL COOPER CO.,
6th Ave., 18th and 19th Sts.,
NEW YORK CITY.

Please mention Marine Review, when writing.

TRADE NOTES.

The National Electric Co., Milwaukee, makers of electrical machinery, have put out a catalogue of exceeding beauty. The illustration is a three-color print of Asti's head of Cosette, a painter who is unrivaled in portraying types of women.

Abram Smith & Son, Algonac, Mich., are distributing a calendar which is bound to provoke a smile. It is posed from life and represents a colored family weighing a new arrival in the household. It is quite easy to pick out both father and mother from the group.

Charles J. Bogue, 213-215 Center street, New York, is a manufacturer of projectors, searchlights and lamps. He has just out a catalogue dealing with his projectors and searchlights which is very well illustrated in wash drawing and which will be sent to anyone interested.

The C. O. Bartlett & Snow Co. of Cleveland, manufacturers of mill and labor-saving machinery, report an order from the Dakota Pressed Brick Co., Deadwood, S. D., for one of their rotary dryers suited to drying 50 tons of sand a day; also an order for conveying machinery.

If one stops to consider for a moment he will realize that there is no end to the uses for wire. If he wants information as to its variety let him write to the American Steel & Wire Co., Chicago, for a list of wire products. The company has just issued a little catalogue that is wire from one end to the other.

Customers of the Geo. Stratford Oakum Co., Jersey City, N. J., have recently received small desk clocks that are both novel and useful. The face is about the size of the Ingersoll watch and the case is of the circular royal capper kind, so that the clock is not only ornamental on a desk, but may be used also as a paper weight. The name Stratford is in small raised letters, not at all prominent on the clock, bespeaking the good taste and conservatism of the people from whom it comes.

As clever a conceit as one may meet with in a week's journey is the little booklet just issued by the Great Lakes Engineering Works, Detroit, Mich., on their propellers. It is in the form of the history of the screw propeller. The little history is illustrated by line drawings of early screws and shows a great deal of research work. In the propellers made by this company semi-steel is used, which permits a reduction in thickness of blades and weight and consequently gives increased efficiency, or greatly increased strength and durability on the same weights as ordinary cast iron.

The C. O. Bartlett & Snow Co., of Cleveland, engineers and manufacturers of elevating, conveying, mining and milling machinery, have just issued their new chain catalogue No. 9, illustrating and describing their new interlocking shoulder bearing chain belts. These chains are made with great care. The strength of all kinds of malleable iron depends very largely on the annealing of it. If properly constructed and annealed it has great strength. Every link in this chain is examined and tested as soon as annealed and if it does not come up to the standard it is immediately thrown out.

While the Sheriffs Manufacturing Co., Milwaukee, does a general business, its specialty, as is well known, is propeller wheels, designed by Mr. Thomas W. Sheriffs. Up to date the company has produced 2,340 propeller wheels in sizes from 12 in. diameter up to 13 ft. in solid and 14 ft. in sectional pattern. The larger output of the wheel is in cast iron although they make them in the smaller sizes, that is up to 8 ft. diameter in cast steel. The wheel is the result of a long continued practice and

experience, and the average number of wheels made is about 130 per annum, the output of 1903 being 156.

No concern gets out more tasty or better trade literature than the Buffalo Forge Co., Buffalo, N. Y. The three latest little booklets which have come to notice are on mechanical induced draft, Buffalo "B" volume blowers and exhausters, and one in the engineering lore series entitled "A Compound Engine Test." This last is the second in a series to be issued. The text of all will be tests of plants in service, and reliable data, all relating to the company's output. The compound engine test was to determine the water consumption, mechanical efficiency, speed regulation and running qualities of the engine. All three booklets will be sent to anyone interested.

THE UPSON-WALTON CO.

CLEVELAND - - - OHIO.

SHIP OUTFITTERS

Have been at it 33 years.

"If you would see their work, look around you."

A list of their outfits, set in small type, would fill a page in the Marine Review.

And in no instance have they been the last to come over the rail.

George Stratford Oakum Company



Established 1860

Jersey City, N. J.

Manufacturers of



Best Oakum

Navy Oakum

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Plumbers Spun Oakum

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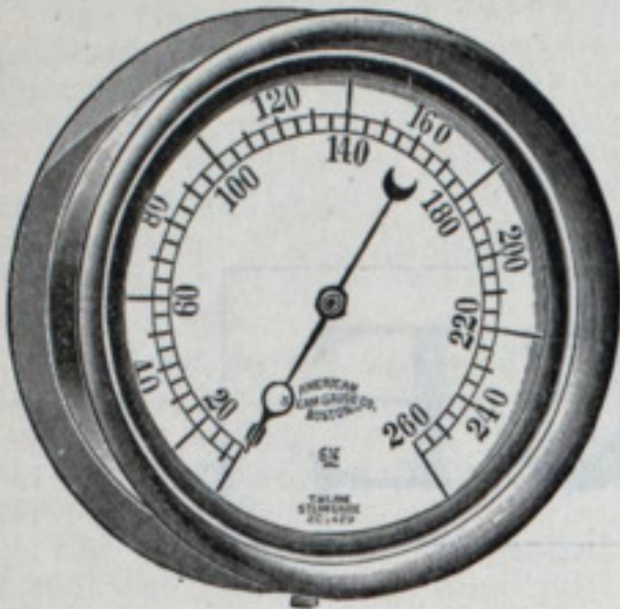
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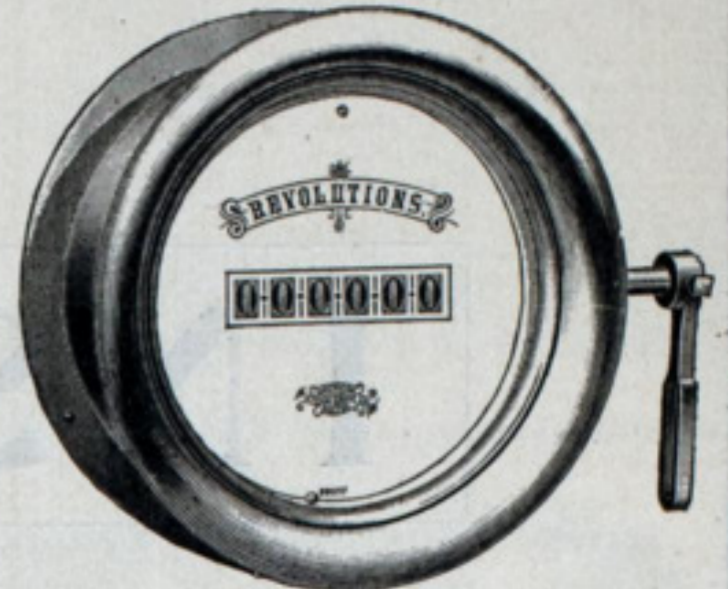
HULLS AND CARGOES



American Pressure Gauge.

ORIGINAL MANUFACTURERS OF
**GAUGES THAT GAUGE,
 INDICATORS THAT INDICATE,
 POPS THAT POP,**

Clocks, Revolution Counters,
 WHISTLES and all kinds of
 STEAMSHIP INSTRUMENTS.



American Revolution Counter.

ORIGINAL AND ONLY GENUINE
THOMPSON INDICATOR.

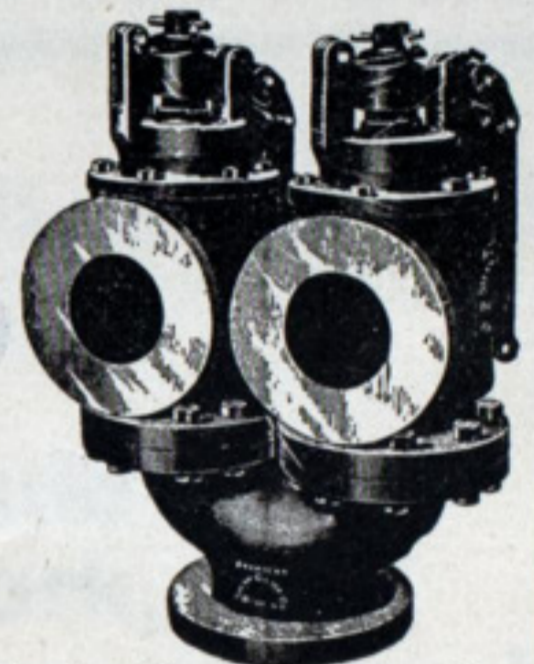
The INDICATOR that made the indicators famous. Highest award at the Paris Exposition 1900. The only American Indicator to receive a medal. The Gold Medal awarded at Pan-American Exposition on Gauges, Pop Valves, Indicators and Engineering Specialties.

SPECIFY AMERICAN AND GET THE BEST.



American Cylinder Relief Valve.

**American Steam Gauge &
 Valve Manufacturing Co.**



American Board of Trade Drop Lever Twin Pop Safety Valves.

NEW YORK.

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THE UNION MACHINE & BOILER CO.

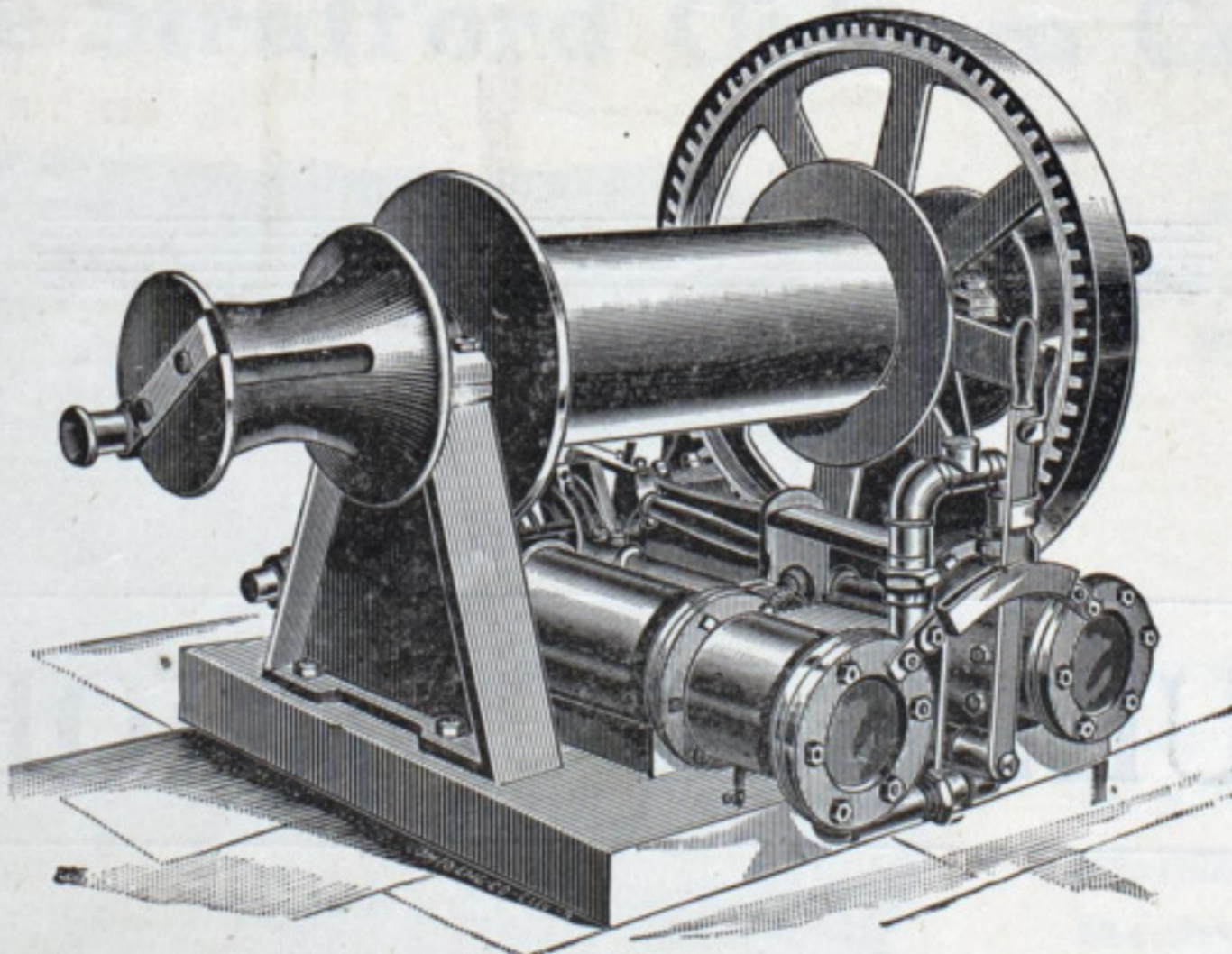
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 REPAIRS DAY or
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AGENTS for
 ST. JOHN'S
 PISTON
 PACKING.

108-114 RIVER STREET

CLEVELAND, OHIO.

Marine Engines for Sale.

Gasoline engines complete, 3 to 50 h. p. Reversing gear, solid three-blade propellers. For particulars address Sarvent Marine Engine Works, 26-28 West Randolph St., Chicago. Feb. 11

Fishing Tug Wanted.

Wanted—First-class steel or wooden fishing tug, about 60 ft. keel; speed about 12 miles an hour. Must be well built and not over four years old. Address I. Lincoln, Alpena, Mich. Jan. 21

Lake Tug for Sale or Charter.

Tug Kate Williams. Length 113 ft., beam 21 ft., S. C. engine 22 and 40 x 30 in. Fire box boiler 8 x 17 ft. Rates A 1½. Entirely rebuilt in 1901. Good condition. Lake Shore Stone Co., 97 Wisconsin St., Milwaukee, Wis. Feb. 11

Boilers and Engine for Sale.

Two Scotch boilers, size 11 ft. 6 in. by 14 ft.; allowed 150 lbs. steam.

One fire box boiler 6 ft. 3 in. by 14 ft.

One steeple compound engine; high pressure cylinder 14 in., low pressure 26 in. and 22 in. stroke.

Address Abram Smith & Son, Algonac, Mich. Jan. 14

U. S. ENGINEER'S OFFICE, Jones Bldg., Detroit, Mich., Jan. 15, 1904. — Sealed proposals for rock and earth excavation under continuing contracts, for improving Middle and West Neebish Channels, St. Marys River, Mich., at West Neebish Rapids, will be received here until 2 p. m. (standard time), March 8, 1904, and then publicly opened. Information furnished on application. W. H. BIXBY, Major, Eng'rs. Mar. 3

U. S. ENGINEER'S OFFICE, Jones Bldg., Detroit, Mich., Jan. 16, 1904. — Sealed proposals for dredging under continuing contracts, for improving Middle and West Neebish Channels, St. Marys River, Mich., at Hay Lake and Mud Lake, will be received here until 2 p. m. (standard time), March 9, 1904, and then publicly opened. Information furnished on application. W. H. BIXBY, Major, Eng'rs. Mar. 3

U. S. ENGINEER OFFICE, Jones building, Detroit, Mich., January 5, 1904. Sealed proposals for removing boulders, excavating limestone bed rock, and dredging in lower Detroit River, will be received here until 2 p. m. (Standard time) February 25, 1904, and then publicly opened. Information furnished on application. W. H. BIXBY, Major, Eng'rs. Feb. 18

U. S. ENGINEER OFFICE, Duluth, Minn., Jan. 2, 1904. — Sealed proposals for furnishing 4,300 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until noon, Feb. 2, 1904, and then publicly opened. Information on application. CHAS. L. POTTER, Capt., Engrs. Jan. 28

WHITE OAK

TIMBERS, PLANK
AND
DIMENSION STOCK

F. S. SHURICK,

18 Broadway, NEW YORK CITY

Steam Barge for Sale.

For Sale.—Steam barge, 131 ft. keel, 25 ft. beam, 9 ft. deep. Capacity, lumber, 260 M. ft.; coal, 375 tons. Good power; can handle two or three barges. Everything pertaining to this boat is in good condition. Terms cash. Address Lock Box 35, St. Clair, Mich. Feb. 11

For Sale.

Tug Duncan City. Address, Geo. Pankrantz Lumber Co., Sturgeon Bay, Wis. tf

Passenger Steamer for Sale.

Up-to-date passenger and freight steamer. Capacity 400 to 500 passengers and 35 tons package freight. Speed about 15 miles an hour. New fore-and-aft compound engine. Marine fire-box boiler. Everything high grade and in very best condition. Address, Indiana Transportation Co., Michigan City, Ind. Jan. 28

Wanted.

Marine engineer to sell water tube boilers. Must be experienced in selling machinery. Address Box 54, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. tf

Steamer for Sale at Cost—\$13,500.

The old Anchor Line twin-screw steamer Gordon Campbell. Two decks, gangways, hoisting machinery, etc. Suited to carrying coal, lumber, ties, package freight, etc. Spent \$3,500 in repairs this year. Other business requires my undivided attention and I will sell for cost to me. W. F. Carroll, 1011 Ashland block, Chicago. t. f.

Yacht for Sale.

New beautiful 100-ft. steam yacht, fully equipped. Owner physically unable to use yacht. Will sell for any reasonable offer. Yacht can be seen in Detroit. Address M. J. STEFFENS, 57 East Twenty-second st., Chicago. tf

Good Tow at a Bargain.

Ten thousand dollars will buy a lake steamer and tow barge that carry 2,200 tons of ore. Steamer has steeple compound engines and Scotch boiler. Address Box 55, Marine Review Pub Co., Wade Building, Cleveland. Jan. 28

**Vessels for Sale.**

Steam barge, two years old; Neafie & Levy machinery; carries 300 tons.

2,000-ton barge

Side-wheel steamer, iron hull.

Small iron ship.

Three steam yachts for pleasure or towing. Address 218 Walnut St., Philadelphia. Feb. 4

Tugs for Sale.

Tug Engine 12x12, Boiler allowed 100 lbs st'm

Tug Engine 17x17, Boiler allowed 90 lbs st'm

Tug Engine 18x18, Boiler allowed 125 lbs st'm

Tug Engine 18x20, Boiler allowed 100 lbs st'm

Tug Engine 18x20, Boiler allowed 115 lbs st'm

For further information apply to L. S. Sullivan, Toledo, O. Feb. 25.

Marine Exhibits at the Sportsmen's Show

Madison Square Garden, New York,
February 19 to March 5.

Will be one of the principal features of the Tenth Annual Exhibit.

A lake 190x60 feet will afford every facility for demonstrations with gasoline and electric launches.

The following leading marine engine and launch builders have already secured exhibit space:

Western Gas Engine Co.
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Lozier Motor Co.
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Smith & Mabley
Hollander & Tangeman
Standard Motor Construction Co.
Gas Engine & Power Co., and Charles L. Seabury & Co.
Lackawanna Motor Co.
The Charles A. Strelinger Co.
Buffalo Gasolene Motor Co.
White Craft & Power Co.
Wm. H. Brodie Co.
The Fairbanks Co.

A limited amount of space still unsold.

For further particulars, address

SPORTSMEN'S EXHIBITION CO.,

1123 Broadway, New York City. Feb. 11

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CANAL STREET, WEST OF FIRST AVENUE,

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Tugs will take care of you all the time

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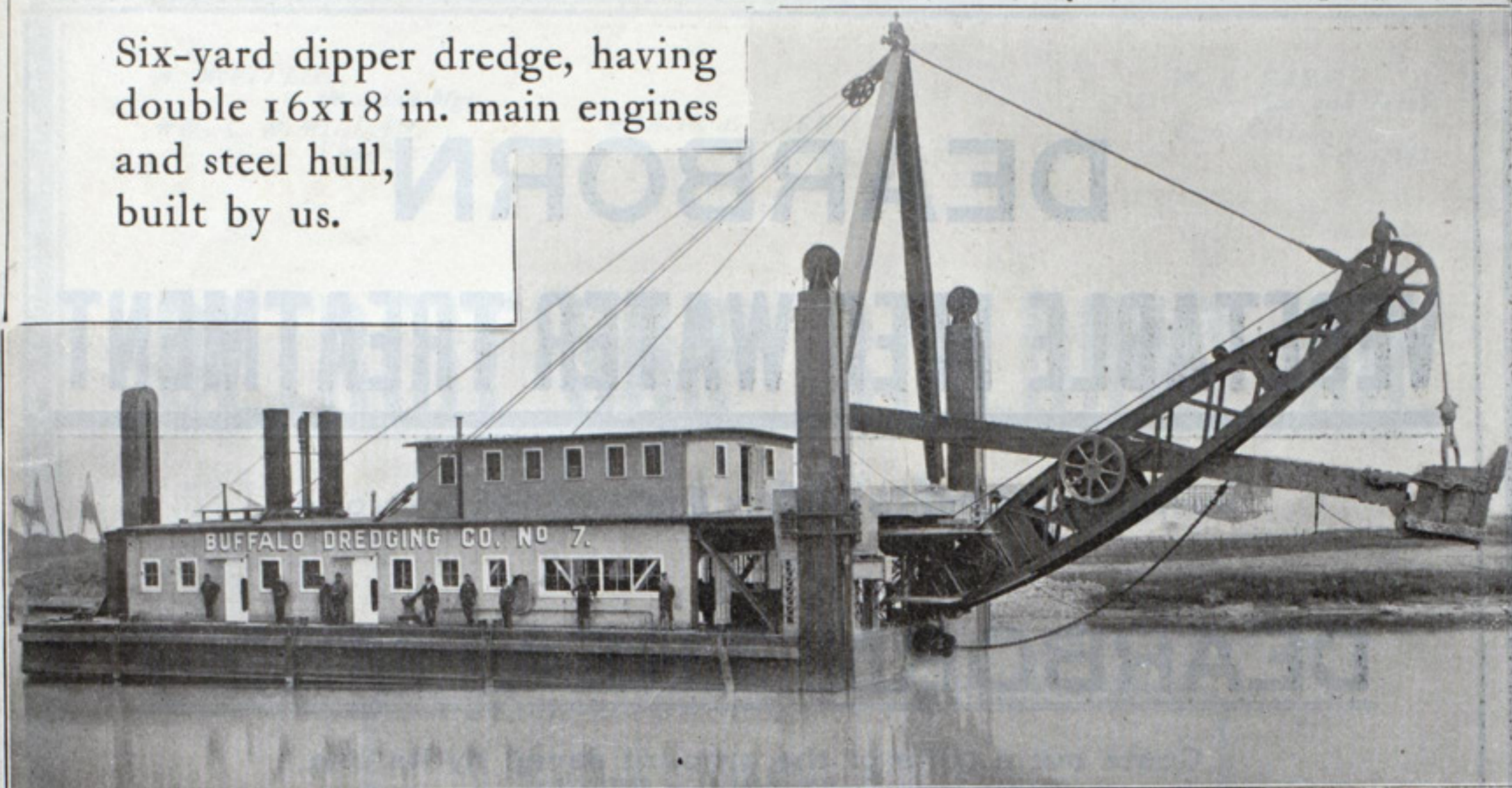
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PORT HURON,
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SO. CHICAGO,
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STEAMER FAVORITE, CHEBOYGAN.

Six-yard dipper dredge, having double 16x18 in. main engines and steel hull, built by us.



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Will contract to remove ROCK or EARTH on the Great Lakes to 40 ft. depth.

To remove ROCK on Atlantic coast to 40 ft. depth.

That's All.

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Brian Boru, Steel.
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another, both Steel.

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Shaughraun, Steel.
Phil Sheridan, Steel.
Spalpeen, Steel.
Paddy Miles, Steel.
Shaun Rhue, Steel.

**We SOMETIMES rent
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ties at OUR terms.**

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Small Scows.

Scows.

Monroe Doctrine,	600 yds.,	Steel.
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No. 7,	600	
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McMyler derrick handling 10
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VEGETABLE FEED WATER TREATMENT

Keeps the BOILERS CLEAN and free from corrosion.

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IT IS USED BY THE BIG FLEETS ON THE LAKES.

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Designers and Builders of all Types of
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for Lake, River and Ocean Service.

Builders of
**Engines, Boilers and
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A large line of dependable and standard makes of CARPETS in VELVETS, BRUSSELS and WILTONS, at the lowest possible prices.

We guarantee our work and cheerfully furnish estimates.

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The Story of Phoebe Snow.

Lackawanna Railroad

If you have ever taken a summer railroad trip, you will enjoy the "Story of Phoebe Snow," which describes in a series of dainty pictures the experiences of a pretty girl who went to Buffalo. The illustrations are in seven colors, each reproducing a design of the girl in white which the Lackawanna Railroad has made so familiar in the last few months. The booklet has a particularly pleasing cover and will afford considerable amusement beside giving information which every traveler ought to know. It will be sent in response to request accompanied by two-cents in stamps to T. W. Lee, General Passenger Agent, New York City.

Lebanon Chain Works,

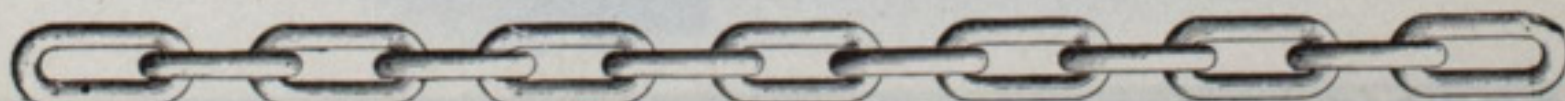
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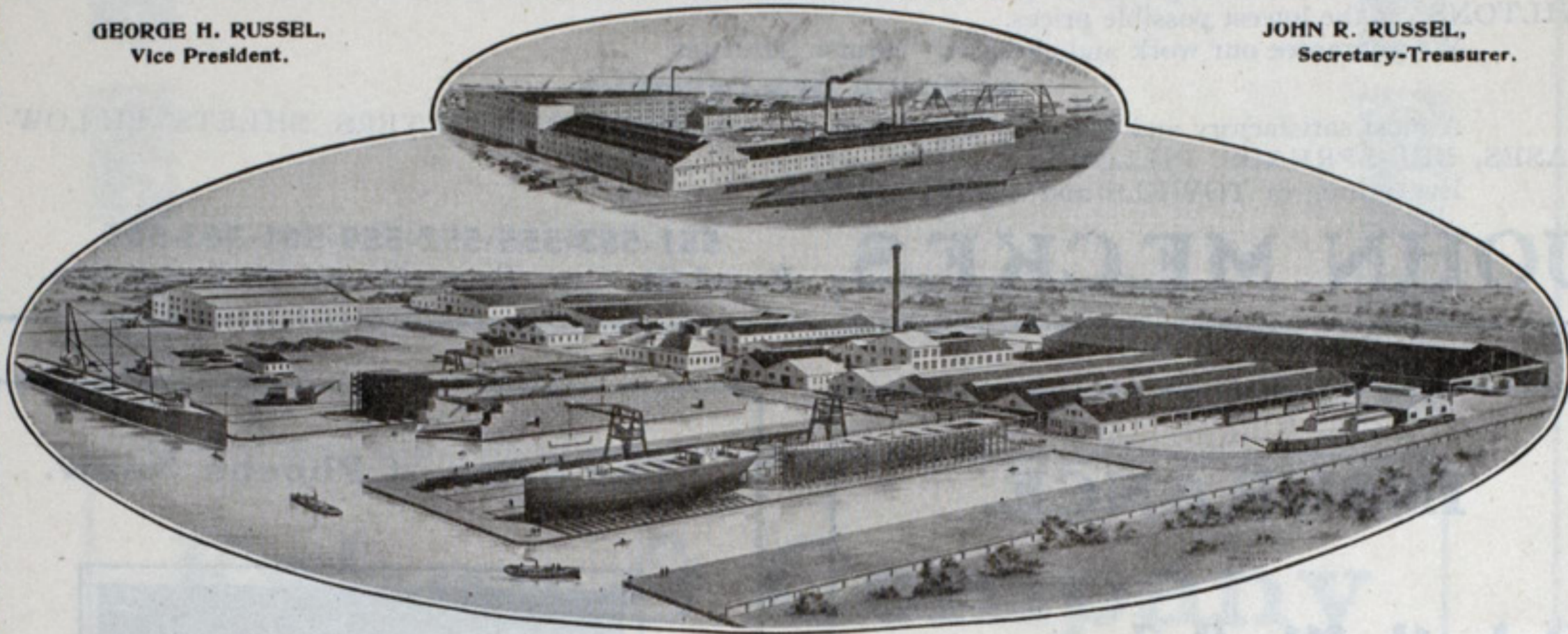
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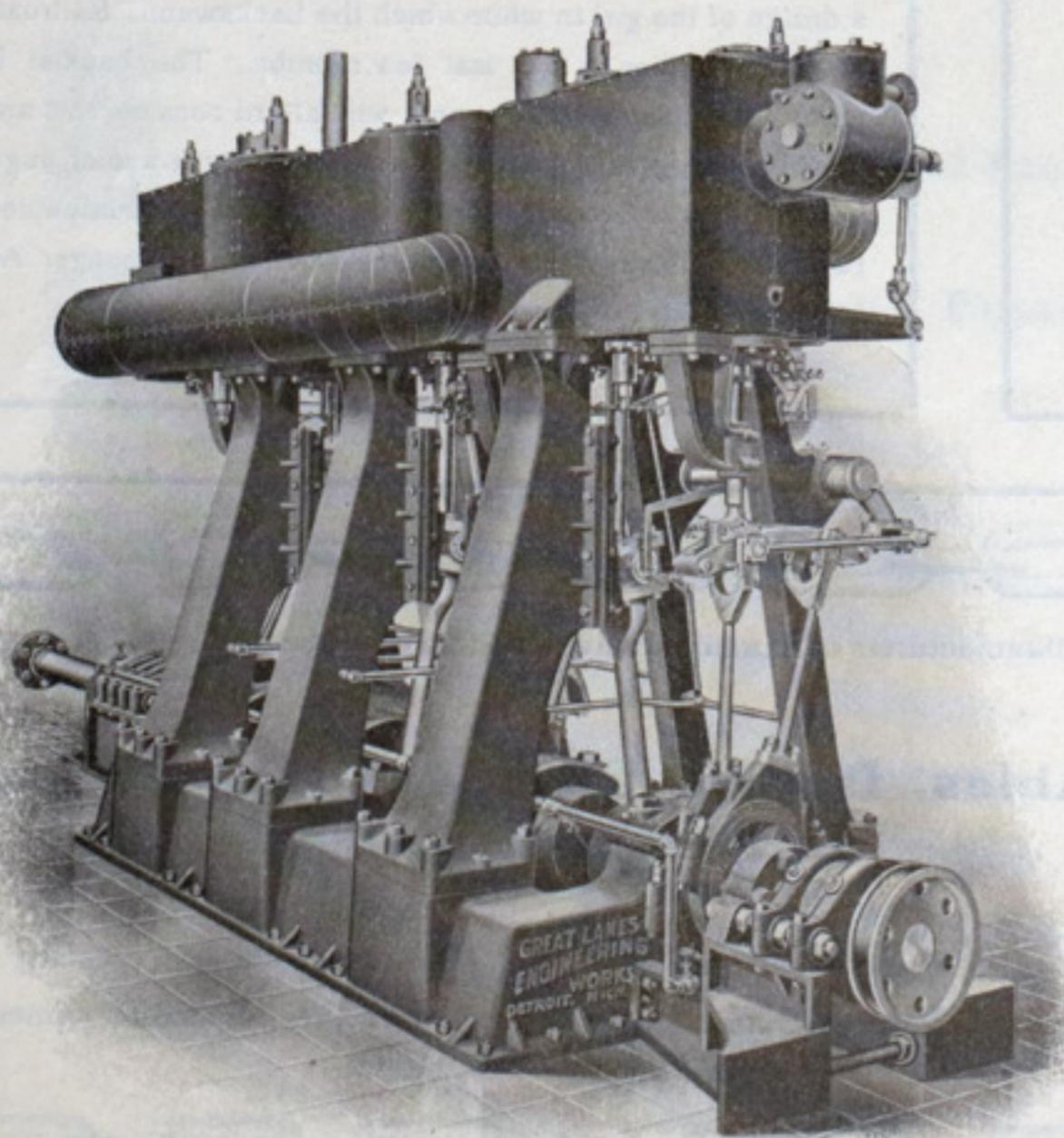
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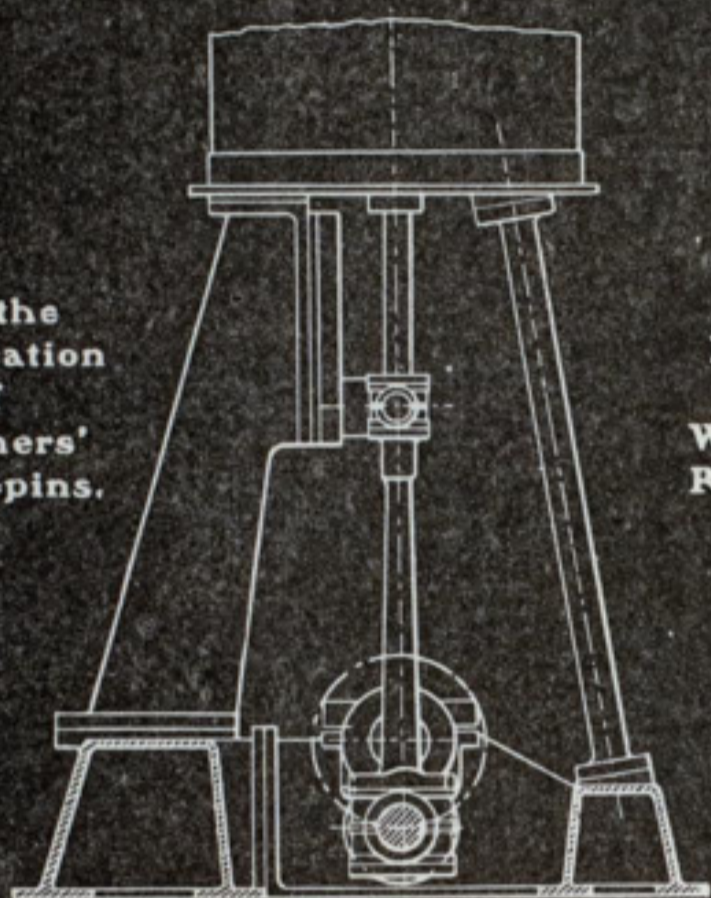
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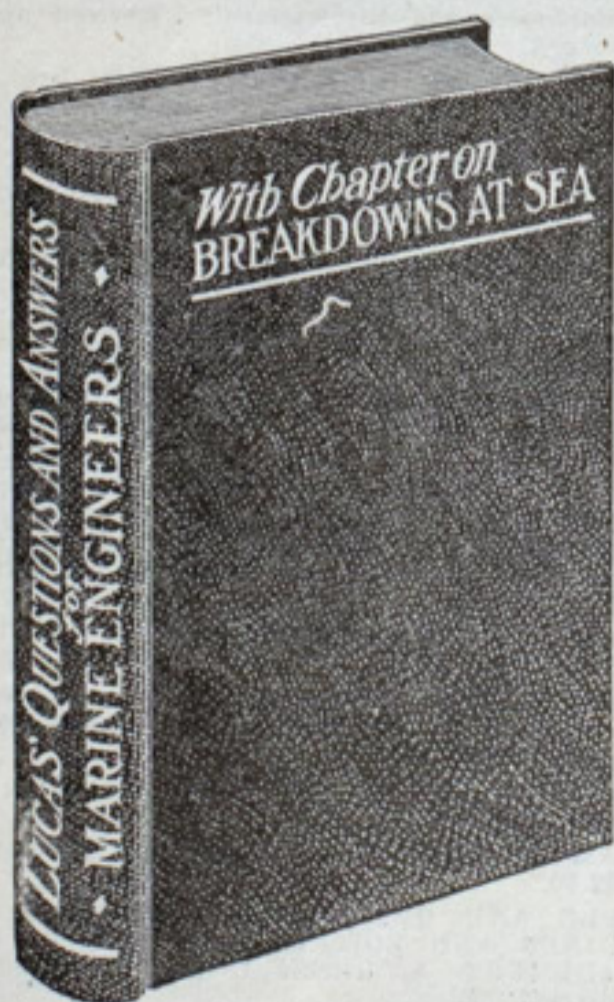
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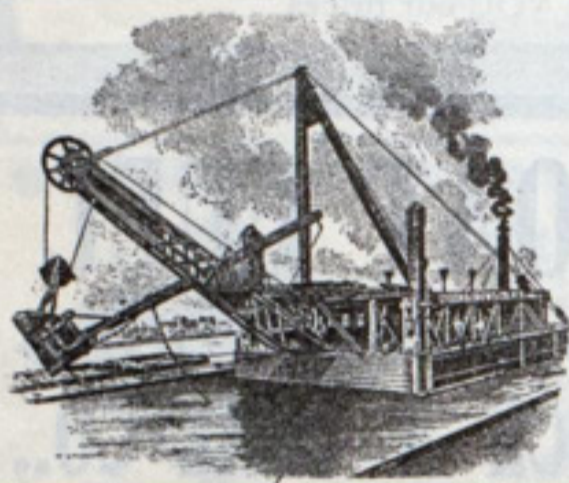
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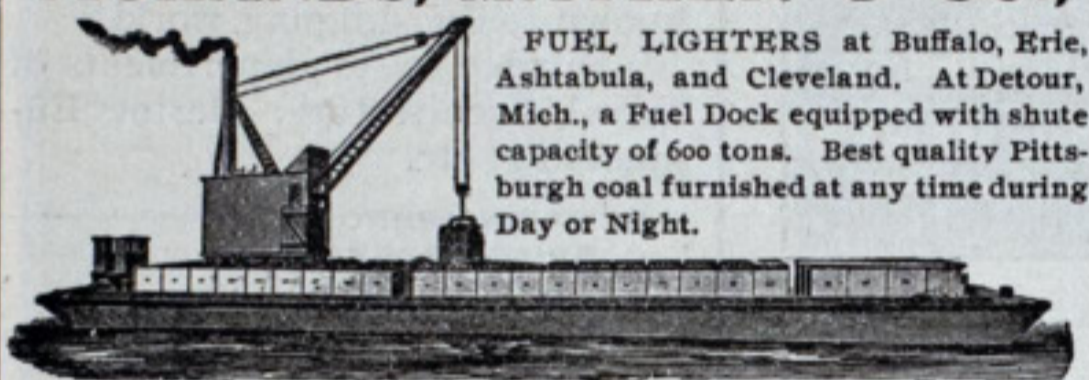
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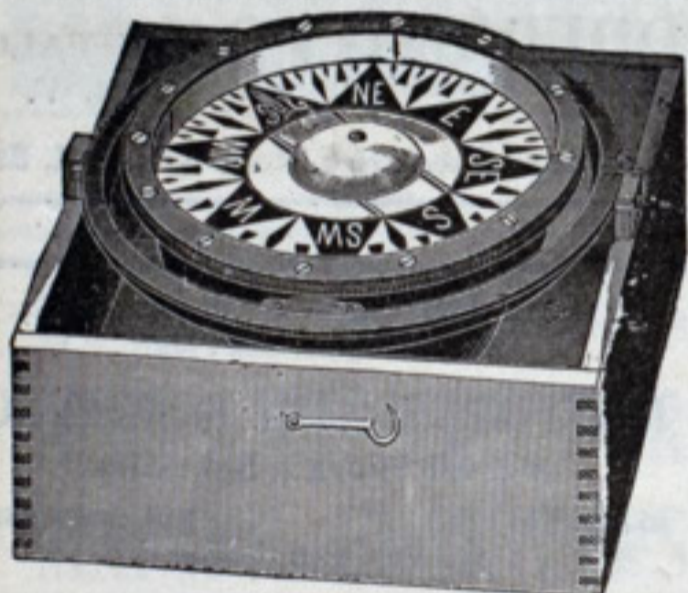
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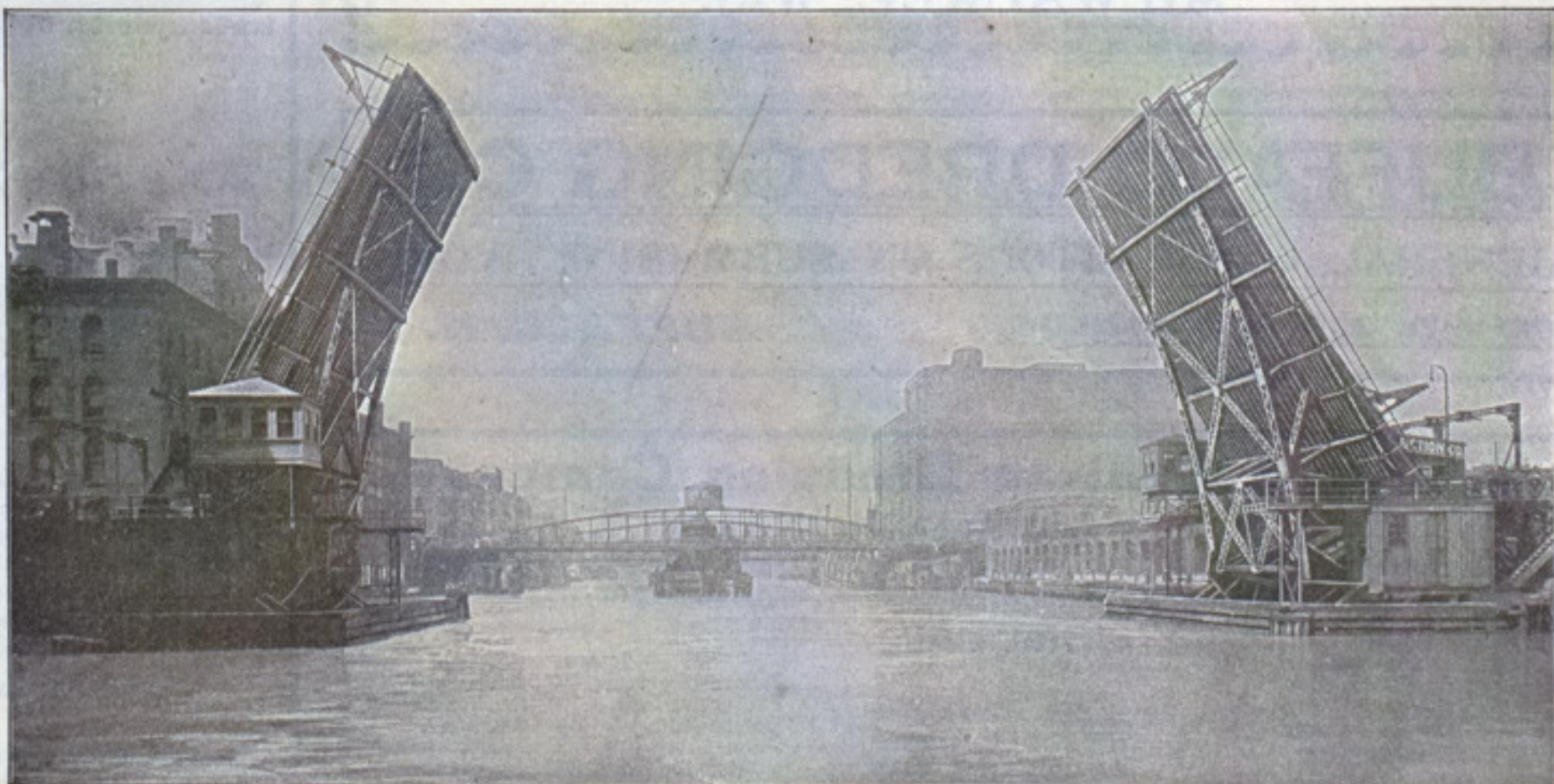
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 Thropp, J. E. & Sons Co.....Trenton, N. J.
 Trout, H. G.....Buffalo.
 United States Ship Building Co.....New York.
 Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.
 Cory, Chas. & Son.....New York.
 MacLean Hydraulic Signal Co.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
 Kieley & Mueller.....New York.
 Lunkenheimer Co.....Cincinnati.
 McCutcheon, C. H.....Buffalo.
 Mooers & Co., H.....Milwaukee.
 New York Belting & Packing Co.....New York.
 Northwestern Steam Boiler & Mfg. Co. Duluth, Minn.
 Rellly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE, MECHANICAL,
CONSULTING.

Hynd, Alexander.....Cleveland.
 Hunt, Robt. W. & Co.....Chicago.
 Kidd, Joseph.....Duluth, Minn.
 Lovejoy, H. O.....Buffalo.
 Matteson & Drake.....Philadelphia.
 Moffat & Son.....San Francisco.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Newman & Merryweather.....New York.
 Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
 Powell, Ambrose V.....Chicago.
 Rice, Henry.....Buffalo.
 Roelker, H. B.....New York.
 Sadler, Perkins & Field.....New York.
 Steel, Adam.....Cleveland.
 Wood, W. J.....Chicago.

EVAPORATING AND DISTILLING APPARATUS.
 Rellly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.
 Rellly Repair & Supply Co., James.....New York.
 Ross Valve Co.....Troy, N. Y.

FIRE BRICK.

Shepard, J. J.....Cleveland.

FIRE CLAY.

Shepard, J. J.....Cleveland.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR
THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
 Fore River Ship & Engine Co.....Quincy, Mass.
 Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
 Ironville Dock & Coal Co.....Toledo, O.
 Pickands, Mather & Co.....Cleveland.
 Pittsburgh Coal Co.....Cleveland.
 Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
 Smith, Stanley B., & Co.....Detroit.
 Smith Coal & Dock Co., Stanley B.....Toledo, O.
 Youghiogheny & Lehigh Valley Coal Co.....Chicago.

GALLEY UTENSILS.

Siegel Cooper Co.....New York.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Lunkenheimer Co.....Cincinnati.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GROCERIES AND SUPPLIES.

Siegel Cooper Co.....New York.

HATCH FASTENERS.

Mulholland, Capt. M.....Cleveland.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
 Brown Hoisting Machinery Co. (Inc.).....Cleveland.
 Chase Machine Co.....Cleveland.
 Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....New York.
 Hyde Windlass Co.....Bath, Me.
 Lidgerwood Mfg. Co.....New York.
 Marine Iron Co.....Bay City.
 Pawling & Harnischfeger.....Milwaukee.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
 Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Lunkenheimer Co.....Cincinnati.
 Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co.....Buffalo.
 Elphicke, C. W. & Co.....Chicago.
 Fleming & Co., P. H.....Chicago.
 Frankfort Marine, A. & P. G. Ins. Co.....New York.
 Gilchrist & Co., C. P.....Cleveland.
 Hawgood & Co., W. A.....Cleveland.
 Helm & Co., D. T.....Duluth.
 Hutchinson & Co.....Cleveland.
 McCarthy, T. R.....Montreal.
 McCurdy, Geo. L.....Chicago.
 Mitchell & Co.....Cleveland.
 Moffat & Son.....San Francisco.
 Peck, Chas. E. & W. F.....New York and Chicago.
 Prindville & Co.....Chicago.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.
 Voss, F. D.....New York.
 Weeks, F. H.....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland.
 Hanna, M. A. & Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
Mariner's Harbor, S. I., N. Y.
 Truscott Boat Mfg. Co.....St. Joseph, Mich.
 Willard, Chas. P.....Chicago.

LIFE FLOATS.

Carley Life Float Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co.....Pittsburg.
 Carley Life Float Co.....New York.
 Drein, Thos. & Son.....Wilmington, Del.
 Kahnweiler's Sons, D.....New York.
 Lane & DeGroot.....Long Island City, N. Y.
 Marine Construction & Dry Dock Co.....
Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson.....Buffalo.

LOGS.

Bliss, John & Co.....New York.
 Nicholson Ship Log Co.....Cleveland.
 Walker & Sons, Thomas.....Birmingham, Eng.
 Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co.....Chicago.
 Lunkenheimer Co.....Cincinnati.

LUMBER.

Martin-Barriss Co.....Cleveland.
 Shurick, F. S.....New York.

MACHINISTS.

Chase Machine Co.....Cleveland.
 Lockwood Mfg. Co.....East Boston, Mass.
 Macbeth Iron Co.....Cleveland.
 Mooers & Co., H.....Milwaukee.
 Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.
 Siegel Cooper Co.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
 Bloomsburg & Co., H.....Baltimore, Md.
 Detroit Ship Building Co.....Detroit.
 Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.
 U. S. Metallic Packing Co.....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Sturtevant, B. F. Co.....Boston.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co.....New York.
 Ritchie, E. S. & Sons.....Brookline, Mass.

NAUTICAL SCHOOLS.

Chicago Nautical School.....Chicago.
 McNevin's Navigation School.....Detroit.
 McNevin's Navigation School.....San Francisco.
 Seattle Nautical School.....Seattle, Wash.

NAVAL ARCHITECTS.

Hynd, Alexander.....Cleveland.
 Kidd, Joseph.....Duluth, Minn.
 Lovejoy, H. O.....Buffalo.
 Matteson & Drake.....Philadelphia.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Newman & Merryweather.....New York.
 Rice, Henry.....Buffalo.
 Sadler, Perkins & Field.....New York.
 Steel, Adam.....Cleveland.
 Wood, W. J.....Chicago.

OAKUM.

DeGrauw, Aymar & Co.....New York.
 Stratford Oakum Co.....Jersey City, N. J.

OIL FOR PAINTING.

Sipe & Co., James B.....Allegheny, Pa.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.
 Standard Oil Co.....Cleveland.

PACKING.

American Steam Packing Co.....Boston.
 Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Katzenstein, L. & Co.....New York.
 New York Belting & Packing Co.....New York.
 United States Metallic Packing Co.....Philadelphia.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
 Detroit Varnish Co.....Detroit.
 Detroit White Lead Works.....Detroit.
 New Jersey Zinc Co.....New York.
 Sipe & Co., James B.....Allegheny, Pa.
 Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PILE DRIVING AND SUBMARINE WORK.

Buffalo Dredging Co.....Buffalo.
 Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.
 Dunbar & Sullivan Dredging Co.....Buffalo.
 Fitz-Simon & Connell Co.....Chicago.
 Lake Erie Dredging Co.....Buffalo.
 Smith Co., L. P. & J. A.....Cleveland.
 Starke Dredge & Dock Co., C. H.....Milwaukee.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland.
 Crane Co.....Chicago.
 Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co.....Cleveland.

PLUMBING, MARINE.

Rellly Repair & Supply Co., James.....New York.
 Sands, Alfred B. & Son.....New York.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PNEUMATIC TOOLS.

Allen, John F. New York.

POLISH FOR METALS.

Bertram's Oil Polish Co. Boston.

PRESSURE REGULATORS.

Kieley & Mueller New York.
Ross Valve Co. Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co. Cleveland.
Atlantic Works East Boston, Mass.
Cramp, Wm. & Sons. Philadelphia.
Detroit Ship Building Co. Detroit.
Fore River Ship & Engine Co. Quincy, Mass.
Great Lakes Engineering Works. Detroit.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.
Lockwood Mfg. Co. East Boston, Mass.
Macbeth Iron Co. Cleveland.
Maryland Steel Co. Sparrow's Point, Md.
Milwaukee Dry Dock Co. Milwaukee.
Newport News Ship Building Co. Newport News, Va.
Phosphor Bronze Smelting Co., Ltd. Philadelphia.
Risdon Iron Works San Francisco.
Roelker, H. B. New York.
Sheriffs Mfg. Co. Milwaukee.
Superior Shipbuilding Co. Superior, Wis.
Thropp & Sons Co., J. E. Trenton, N. J.
Trout, H. G. Buffalo.
United States Ship Building Co. New York.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co. New York.
Great Lakes Engineering Works. Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.

PUNCHES, RIVETERS, SHEARS.

Allen, John F. New York.

RANGES.

Russell & Watson Buffalo.
Siegel Cooper Co. New York.

REFRIGERATING APPARATUS.

Roelker, H. B. New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register Cleveland.
Record of American & Foreign Shipping. New York.

RIVETING MACHINES.

Allen, John F. New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. Cleveland.

SAFETY VALVES.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Crane Co. Chicago.
Hayden Mfg. Co., N. L. Columbus, O.
Lunkenheimer Co. Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. Buffalo.
Upson-Walton Co. Cleveland.
Wilson & Silsby Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS, NAUTICAL.

Chicago Nautical School Chicago.
McNevin's Navigation School Detroit.
McNevin's Navigation School San Francisco.
Seattle Nautical School Seattle, Wash.

SEARCH LIGHTS.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. Cleveland.

SHIP BUILDERS.

American Ship Building Co. Cleveland.
Atlantic Works East Boston, Mass.
Buffalo Dry Dock Co. Buffalo.
Cramp, Wm. & Sons. Philadelphia.

Craig Ship Building Co. Toledo, O.
Chicago Ship Building Co. Chicago.
Detroit Ship Building Co. Detroit.
Fore River Ship & Engine Co. Quincy, Mass.
Great Lakes Engineering Works. Detroit.
Jenks Ship Building Co. Port Huron, Mich.
Lockwood Mfg. Co. East Boston, Mass.
Manitowoc Dry Dock Co. Manitowoc, Wis.
Maryland Steel Co. Sparrow's Point, Md.
Milwaukee Dry Dock Co. Milwaukee.
Newport News Ship Building Co. Newport News, Va.
Risdon Iron Works San Francisco.
Roach's Ship Yard. Chester, Pa.
Shipowner's Dry Dock Co. Chicago.
Smith & Son, Abram. Algonac, Mich.
United States Ship Building Co. New York.
Willard, Chas. P. & Co. Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. Buffalo.
Reilly Repair & Supply Co., James. New York.
Upson-Walton Co. Cleveland.

SHIP LANTERNS AND LAMPS.

Russell & Watson Buffalo.

SHIP TIMBER.

Martin-Barriss Co. Cleveland.
Shurick, F. S. New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR, SOLID.

Falls Hollow Staybolt Co. Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co. New York.
Gilchrist & Co., C. P. Cleveland.
Holmes, Samuel. New York.
McCarthy, T. R. Montreal, Can.
Moffat & Son. San Francisco.
Newman & Merryweather. New York.
Weeks, F. H. New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line. New York.
International Mercantile Marine Co. Philadelphia.
Pere Marquette R. R. & S. S. Line. Milwaukee.
Red Star Line. New York.

STEEL CASTINGS.

Seaboard Steel Casting Co. Chester, Pa.
Macbeth Iron Co. Cleveland.

STEERING APPARATUS.

American Ship Building Co. Cleveland.
Chase Machine Co. Cleveland.
Dake Engine Co. Grand Haven, Mich.
Detroit Ship Building Co. Detroit.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.
Moulton Steering Engine Co. New York.
Pawling & Harnischfeger. Milwaukee.
Sheriffs Mfg. Co. Milwaukee.

STOCKS, BONDS, SECURITIES.

Fahey & Co. Cleveland.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J. Boston.
Schrader's Son, A. New York.

SURVEYORS, MARINE.

Gaskin, Edward. Buffalo.
Hynd, Alexander. Cleveland.
Lovejoy, H. O. Buffalo.
Matteson & Drake. Philadelphia.
Nacey, James. Cleveland.
Newman & Merryweather. New York.
Rice, Henry. Buffalo.
Steel, Adam. Cleveland.
Wood, W. J. Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co. Chicago.
Pittsburg Testing Laboratory Ltd. Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co. New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F. New York.
Watson-Stillman Co. New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc. Philadelphia.

TOWING MACHINES.

American Ship Windlass Co. Providence, R. I.
Chase Machine Co. Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.
Midland Towing & Wrecking Co., Ltd. Midland, Ont.

TRAPS, STEAM.

Kieley & Mueller New York.
Lunkenheimer Co. Cincinnati.
Sturtevant Co., B. F., Jamaica Plain. Boston.

TRUCKS.

Boston & Lockport Block Co. Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co. Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Crane Co. Chicago.
Jenkins Bros. New York.
Kieley & Mueller. New York.
Lunkenheimer Co. Cincinnati.
Moors & Co., H. Milwaukee.
Ross Valve Co. Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co. Troy, N. Y.

VARNISHES.

Detroit Varnish Co. Detroit.
Detroit White Lead Works. Detroit.
New Jersey Zinc Co. New York.
Also Ship Chandlers.

VESSEL AND FREIGHT AGENTS.

Boland, John J. Buffalo.
Brown & Co. Buffalo.
Elwell, Jas. W. & Co. New York.
Elphicke, C. W. & Co. Chicago.
Fleming & Co., P. H. Chicago.
Gilchrist & Co., C. P. Cleveland.
Hall & Root. Buffalo.
Helm & Co., D. T. Duluth.
Hawgood & Co., W. A. Cleveland.
Holmes, Samuel. New York.
Hutchinson & Co. Cleveland.
McCarthy, T. R. Montreal.
Moffat & Son. San Francisco.
Newman & Merryweather. New York.
Mitchell & Co. Cleveland.
Prindiville & Co. Chicago.
Richardson, W. C. Cleveland.
Sullivan, D. & Co. Chicago.
Weeks, F. H. New York.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. Boston.

VESSEL FURNISHINGS.

Siegel Cooper Co. New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. Buffalo.
DeGrauw, Aymar & Co. New York.
Upson-Walton Co. Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Lunkenheimer Co. Cincinnati.

WINDLASSES.

American Ship Windlass Co. Providence, R. I.
American Ship Building Co. Cleveland.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.

WINCHES.

American Ship Windlass Co. Providence, R. I.
Hyde Windlass Co. Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.
Midland Towing & Wrecking Co., Ltd. Midland, Ont.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son. Wilmington, Del.
Lane & DeGroot. Long Island City, N. Y.
Marine Construction & Dry Dock Co. New York.
Truscott Boat Mfg. Co. St. Joseph, Mich.
Willard, Chas. P. & Co. Chicago.

YAWLS.

Drein, Thos. & Son. Wilmington, Del.
Lane & DeGroot. Long Island City, N. Y.



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SAW MILL & LUMBER CO.

ESTABLISHED 1873.

CLEVELAND, OHIO.



White Pine Ship Decking.
Large Stock on Hand.
Special Bills Cut to Order.

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BOURNE-FULLER CO.,
IRON, STEEL,
PIG IRON,
COKE,
CLEVELAND, OHIO.**

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ANGLES

BULB ANGLES

BEAMS

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TEES ZEES

PLATES

Rectangular and Sketch

Circles Heads

BESSEMER**AND****OPEN HEARTH****FROM MILLS**

We are prepared to supply, in any quantity, any or all of this material and at the closest market prices.

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We carry at our warehouses the largest and most comprehensive stock in the country of such material, for immediate shipment. We are prepared to cut to lengths, Beams, Channels, Angles, etc., on short notice.

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Our facilities were never better for supplying all
IRON AND STEEL MATERIALS for VESSEL CONSTRUCTION.

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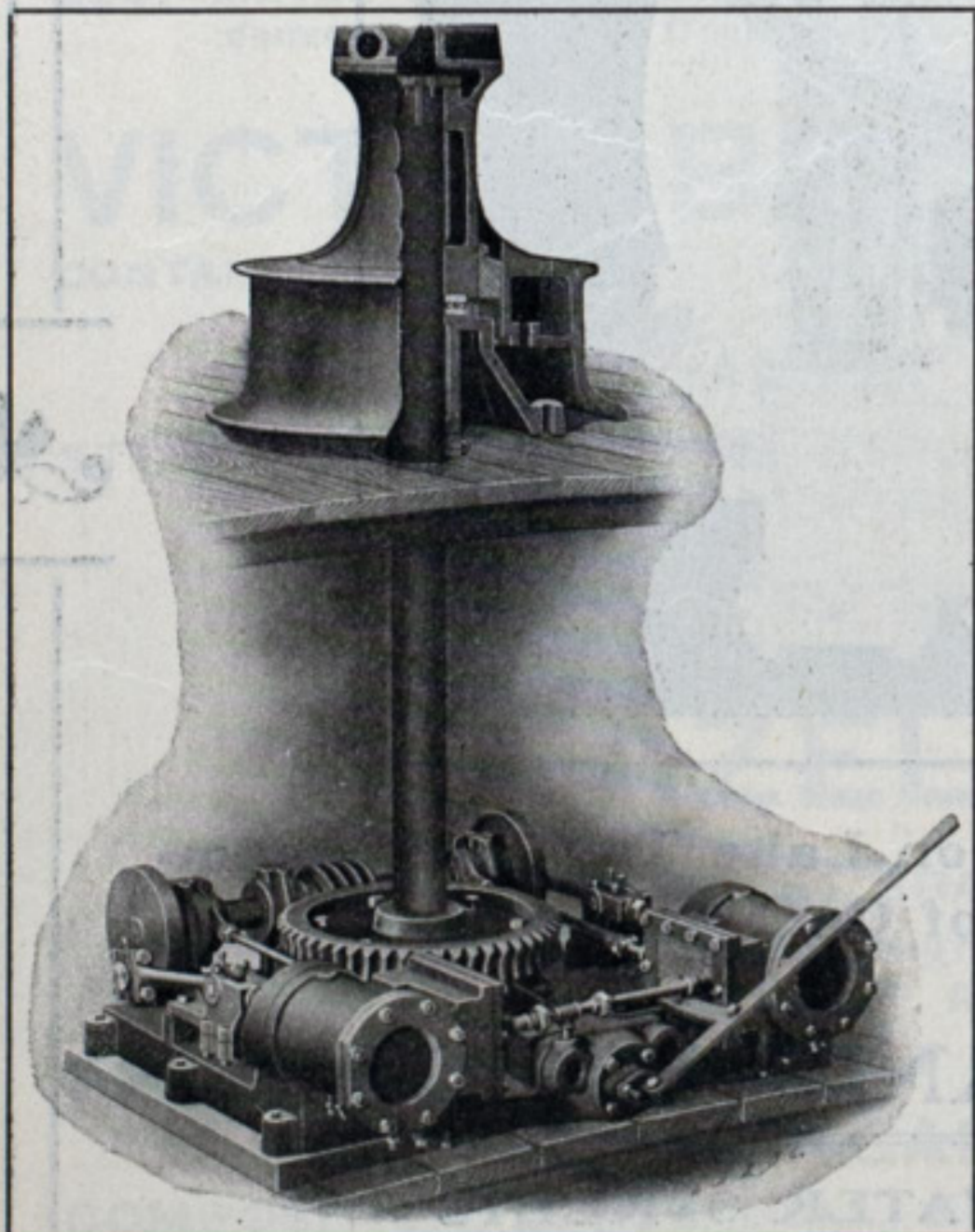
We will bid on or furnish specifications. We can furnish from stock almost any of your requirements, viz:

**LINENS, CHINA, GLASS,
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SIXTH AVE. MEET ME AT THE FOUNTAIN 18TH & 19TH STS.
NEW YORK CITY.



(Figure 230)

DOUBLE-BARRELLED STEAM CAPSTAN.

THE CHASE MACHINE CO.

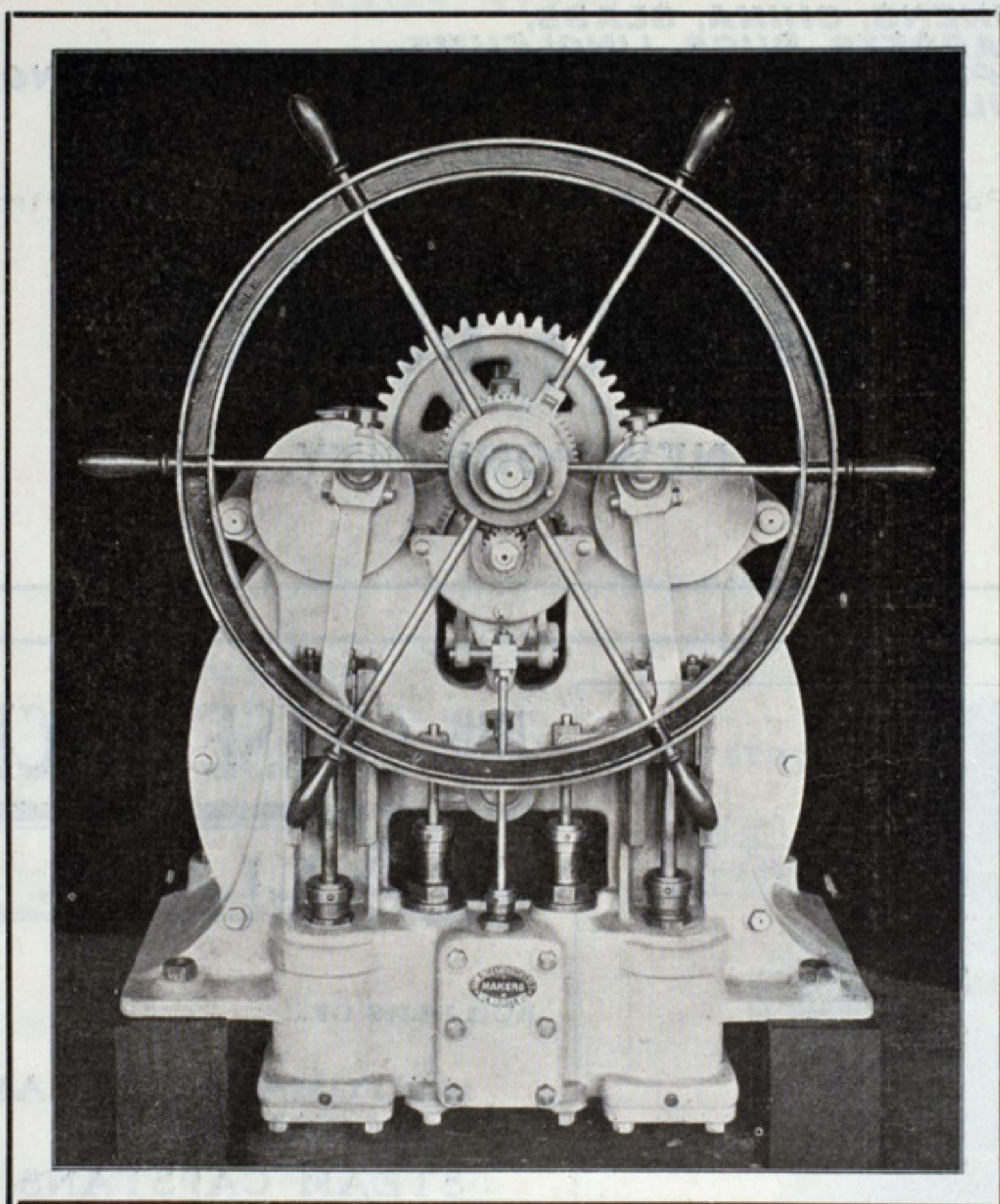
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DOCKING AND HAULING
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GASOLINE TUG BOAT AND
DELIVERY BOAT ENGINES
and other Specialties.**

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More of our Gears are in service on Lake Tugs and Steamers than any other make of Gear or Machine.

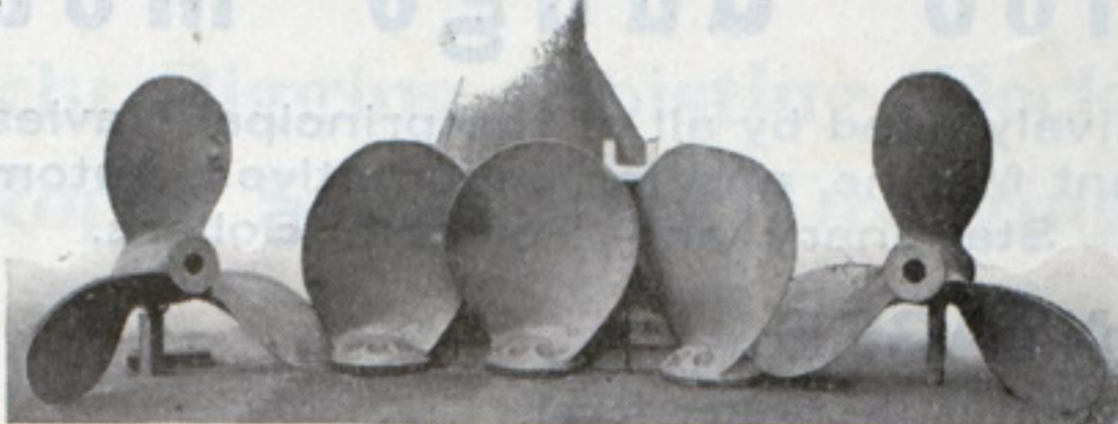
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CLINTON AND SOUTH WATER STREETS
MILWAUKEE - - - WISCONSIN.

THE VICTOR METALS CO.

HOME OFFICE AND PLANT, EAST BRAINTREE, MASS.

VICTOR C. LASSEN,
Pres. and Genl. Supt.



ERICH. EWERTZ,
Treas. and Genl. Mgr.

BRONZE CASTINGS FOR U. S. GOV.

Manufacturers of the

VICTOR NON-CORROSIVE SILVER METAL

THE ONLY SALT WATER AND ACID PROOF METAL.

TENSILE STRENGTH, 53,280 LBS., ELONG. 16 PER CENT.

NO TARNISHING, ALWAYS BRIGHT, POLISHING, TAKES A SILVER FINISH.
BEST METAL FOR Bilge and Mining Pumps, Valves, Fittings, SEA CONNECTIONS, Condensers, Propellers, Deck Fittings, Railings, Hardware, Plumbing Fixtures, Etc.

VICTOR BRONZE THE ONLY CAST BRONZE THAT CAN BE FORGED.
CONTAINS NO IRON. TENSILE STRENGTH, 65,000 LBS., ELONG. 37 PER CENT.

THE METAL FOR PROPELLERS

STERN POSTS, RUDDERS, STRUTS, GUNS AND OTHER CASTING WHERE GREAT STRENGTH IS REQUIRED.

BILLETS CAST ANY SHAPE FOR FORGINGS.

AZELIA ANTI-FRICTION METAL.

HIGHEST GRADE BEARING METAL.

No better Metal made for High Speed or Heavy Working Engines and Machinery.

PHOSPHOR BRONZE **ALUMINUM BRONZE**
MANGANESE BRONZE

COMPOSITION, BRASS, BELL, ELECTRICAL and GOLDEN BRONZE, PURE HARDENED COPPER.

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PROMPT DELIVERIES.

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Klinger Reflex Water Gauges

AND

Wiltbonco Gauge Mountings

Are very extensively used by all of the principal Navies of the World, Merchant Marine, and for Locomotives, Automobiles, Stationary and Portable Boilers.

ADVANTAGES:

Quick and reliable observation of the water level.
Safe, sure and durable at high pressures.
Not affected by cold air drafts.
Most effective protection against injury to boilers.
All other safety devices, wire netting, etc., superfluous.
Absolute protection against injuries to workmen.
Eliminating expense for exchange glass tubes.
Saving annoyance and loss of time due to breakage.
Easy application to all existing boiler mountings.
Glass easily removed for cleaning without disturbing connections.

**THE ACCOMPANYING CUTS ILLUSTRATE
REPRESENTATIVE TYPES OF MOUNTINGS
AS SUPPLIED FOR THE UNITED STATES
TORPEDO DESTROYERS:**

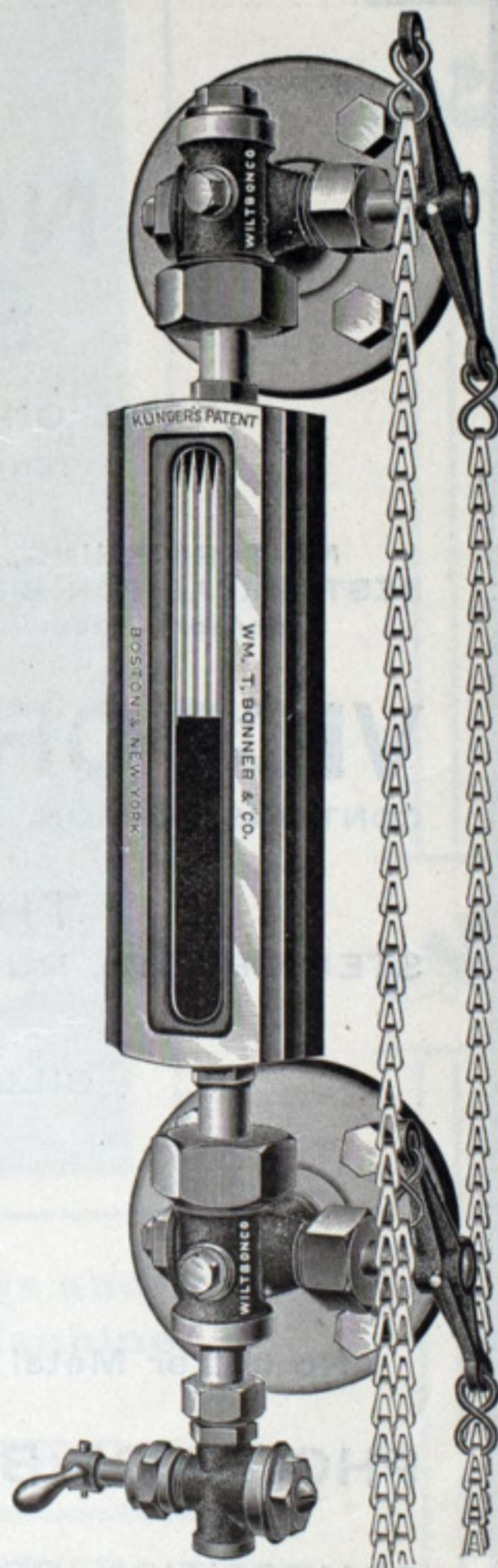
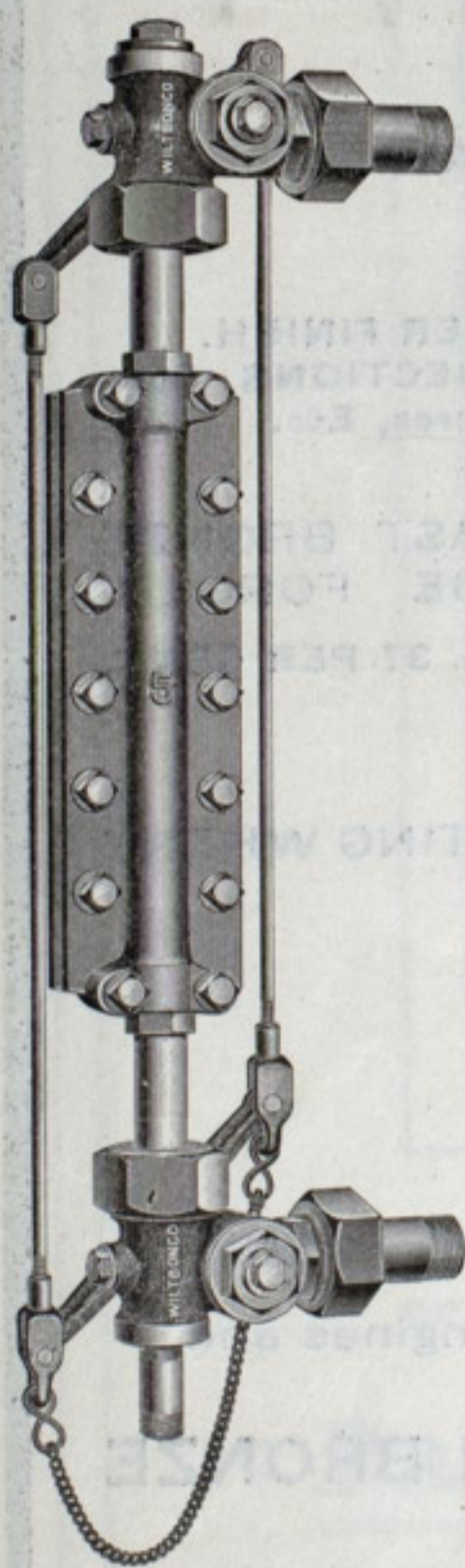
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DALE
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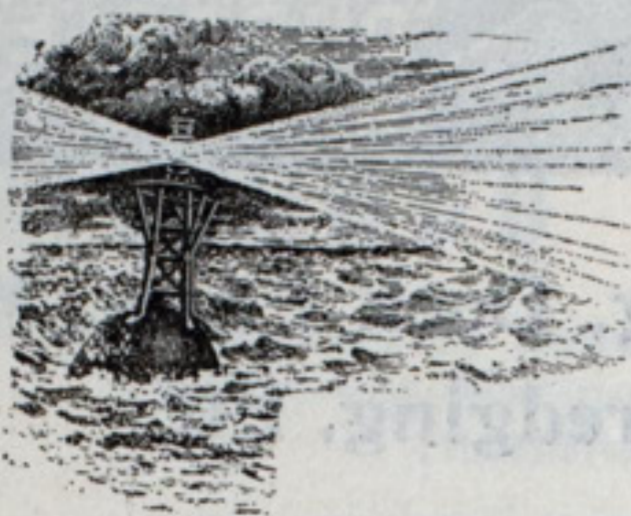
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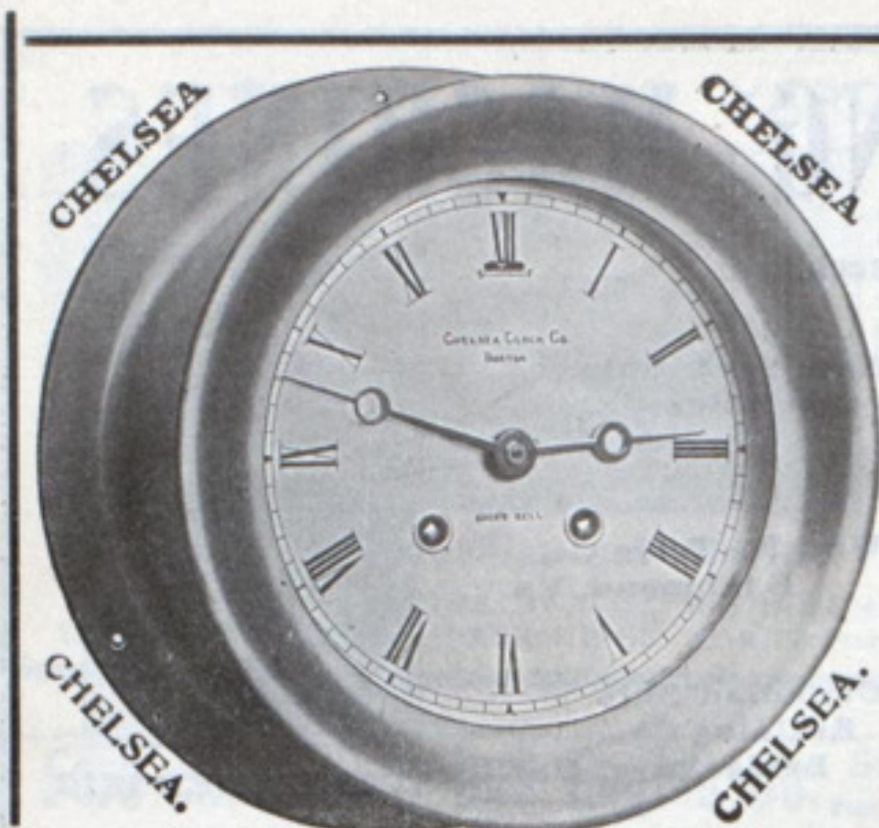
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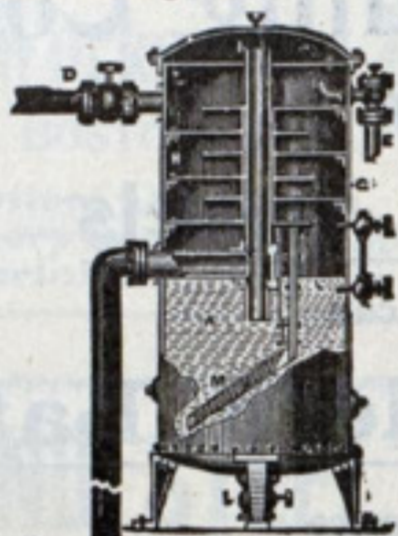
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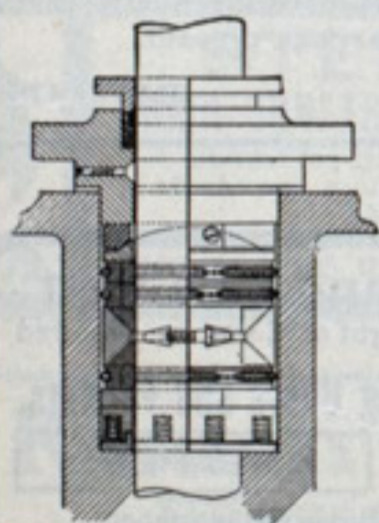
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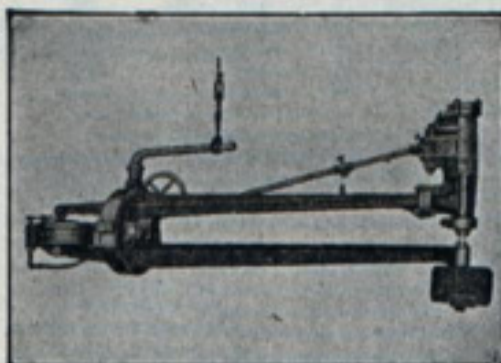
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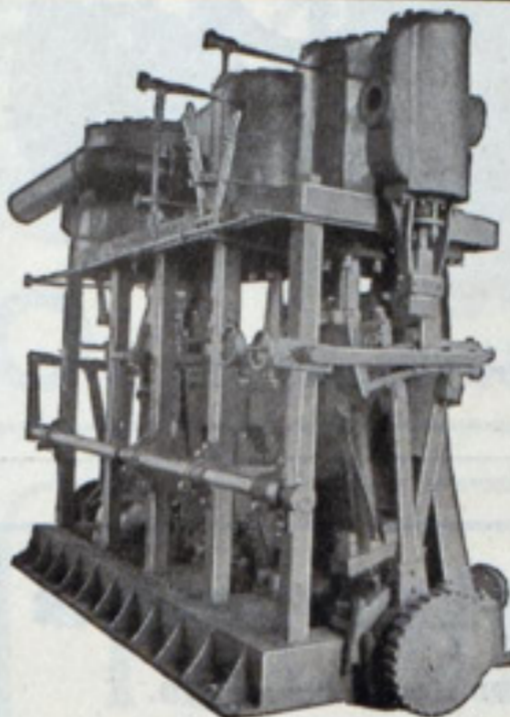
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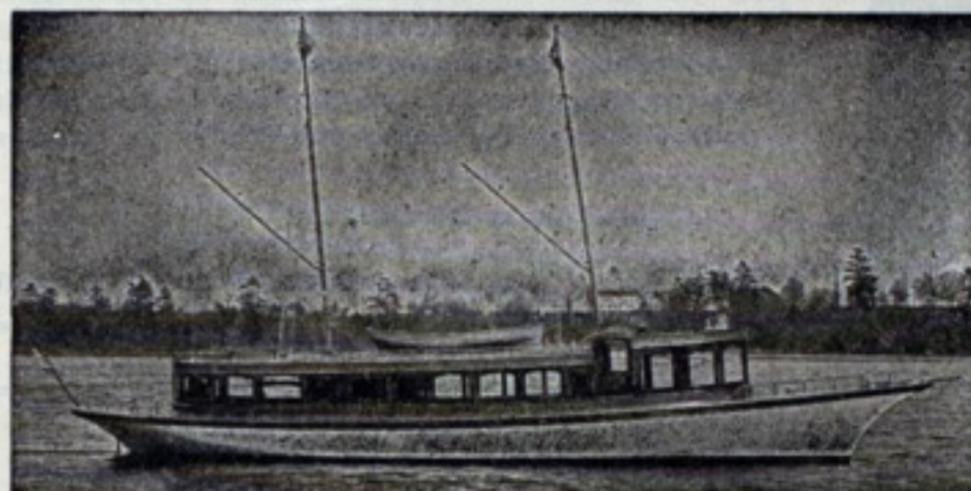
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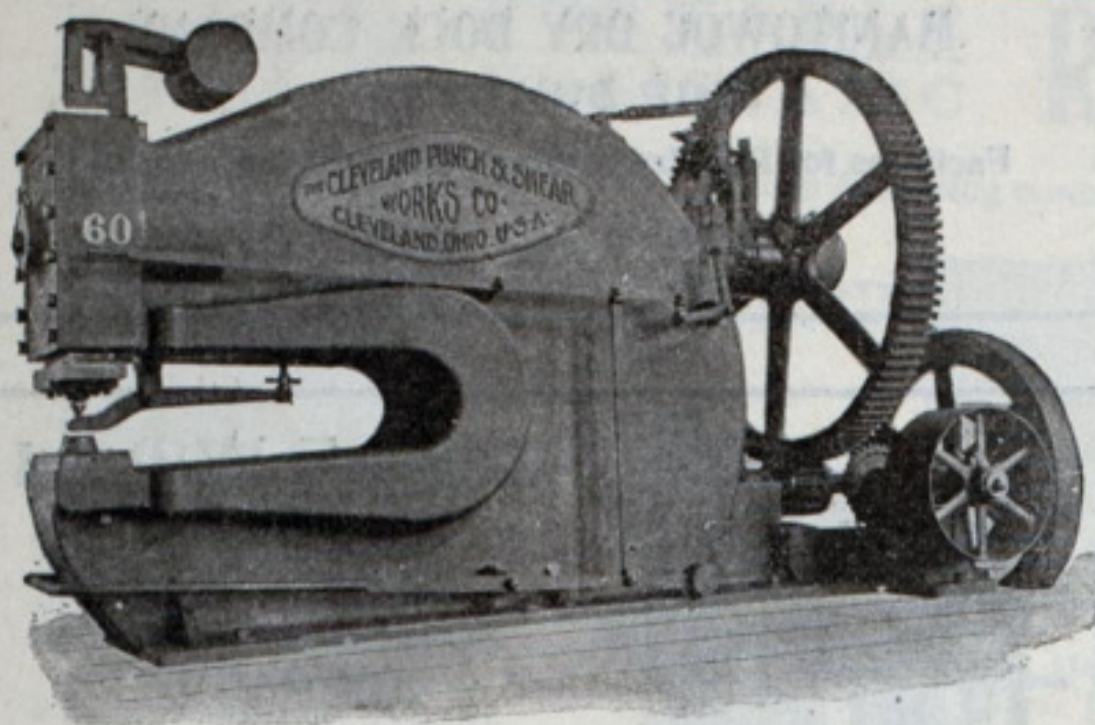
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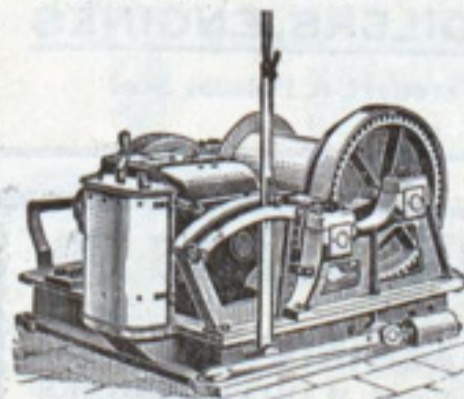
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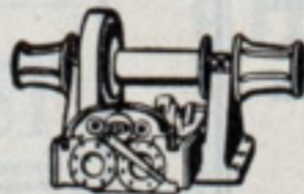
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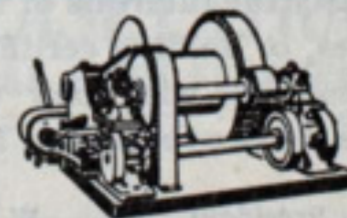
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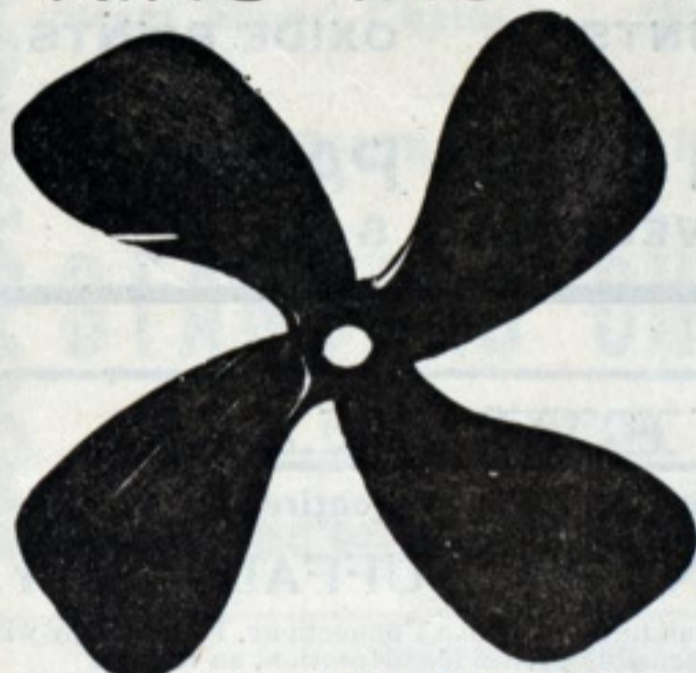
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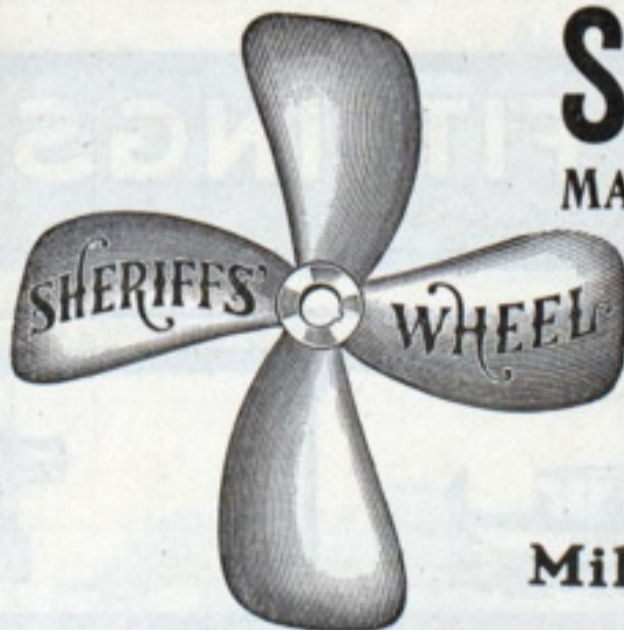


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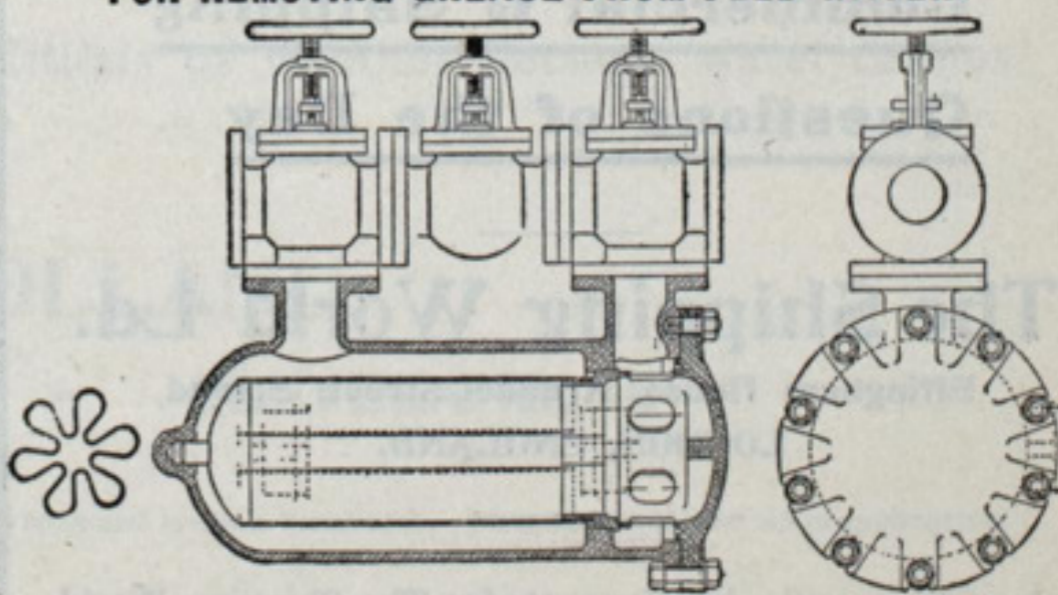
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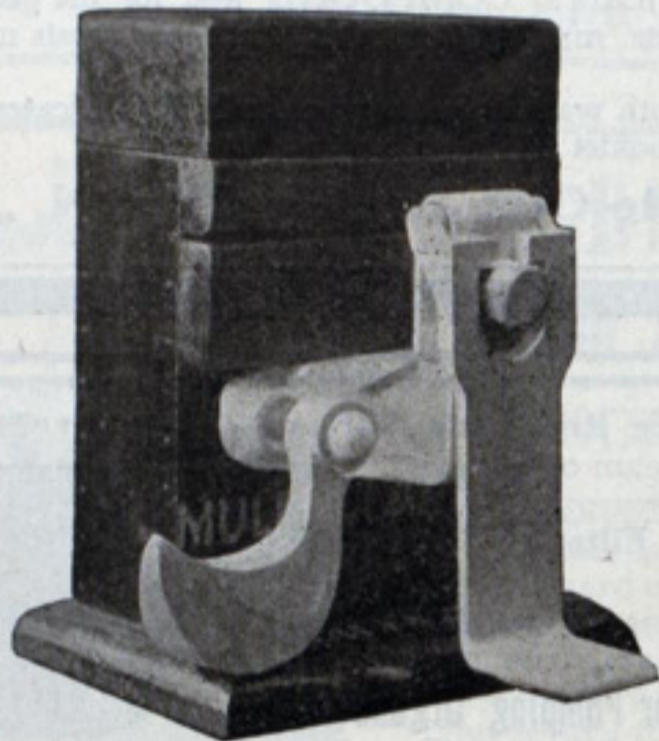
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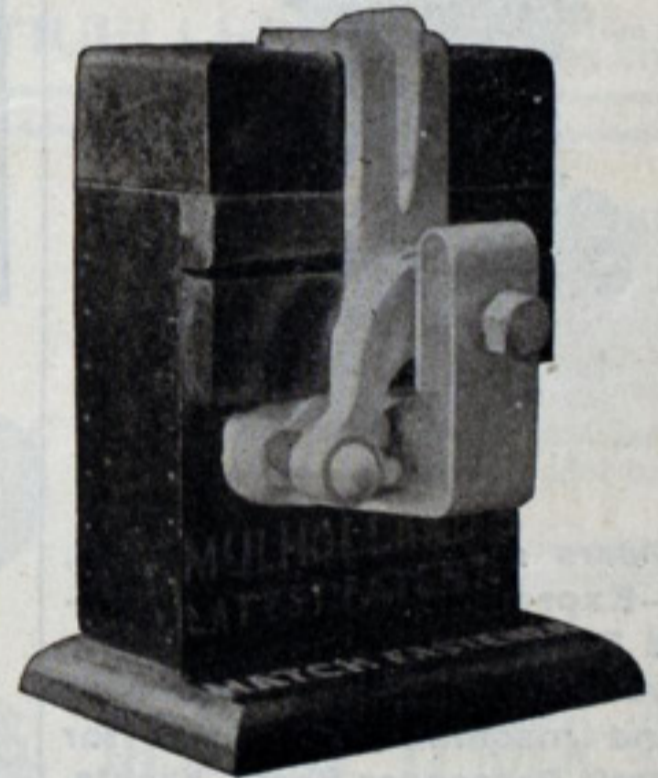


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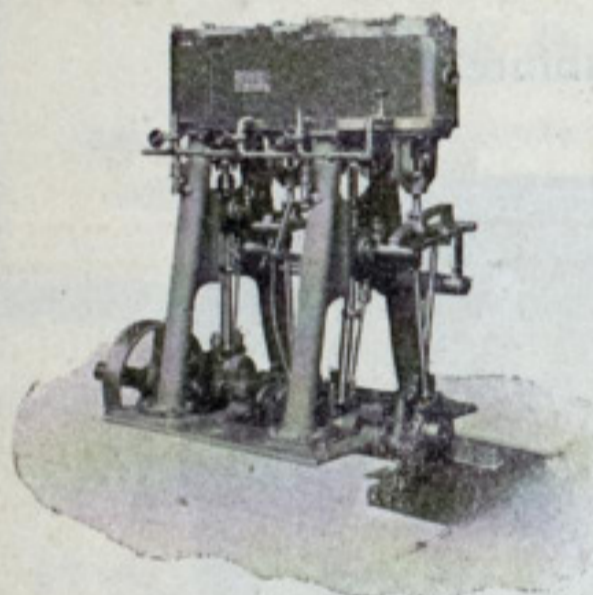


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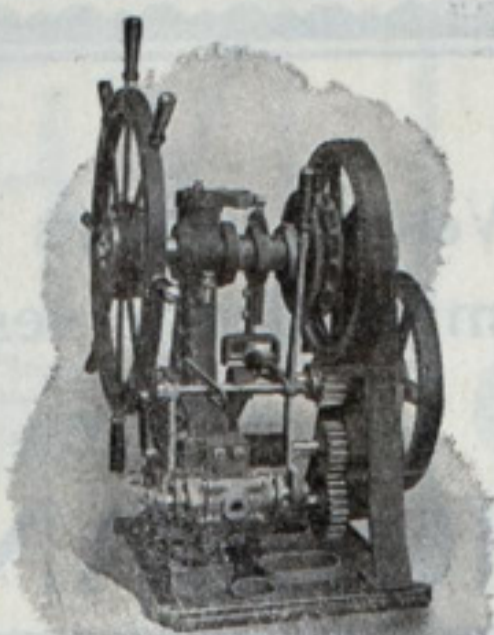


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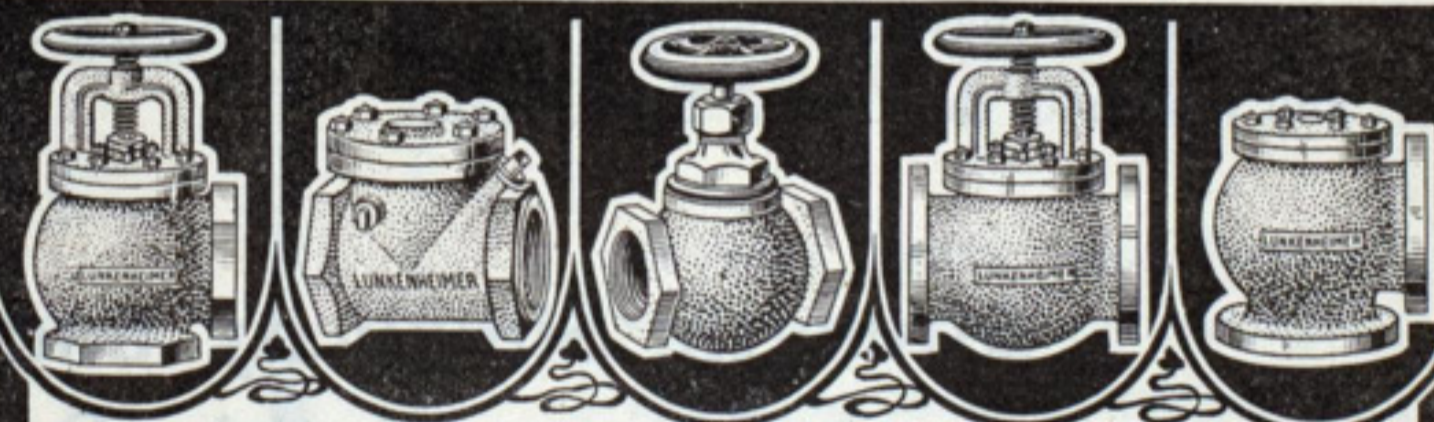


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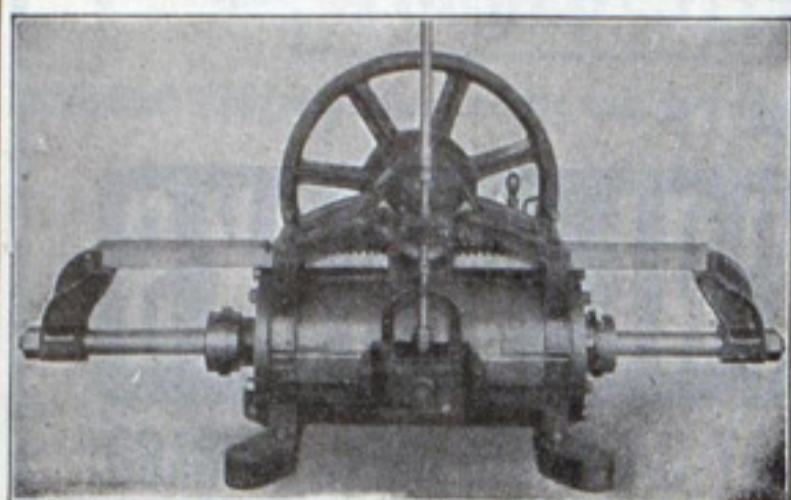
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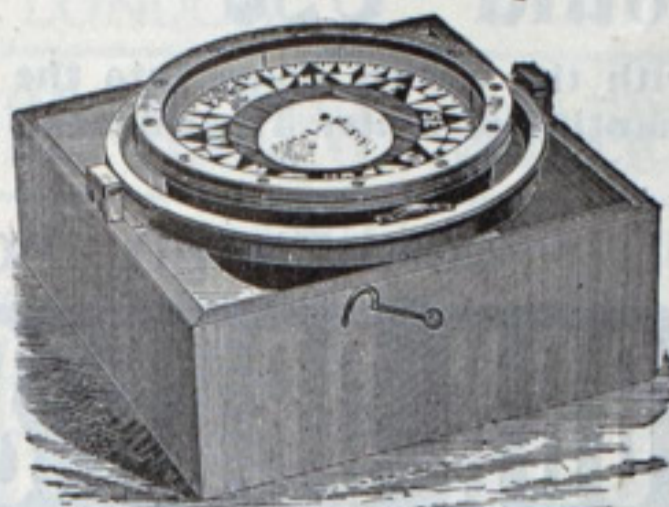
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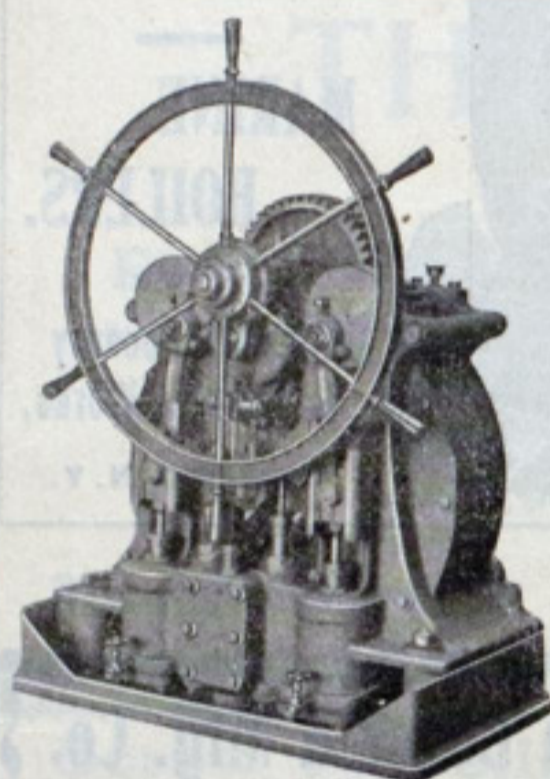
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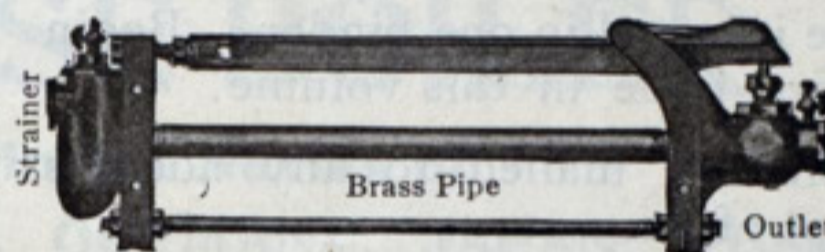
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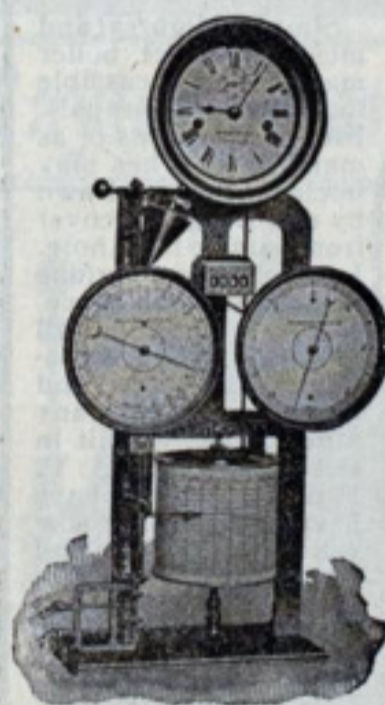
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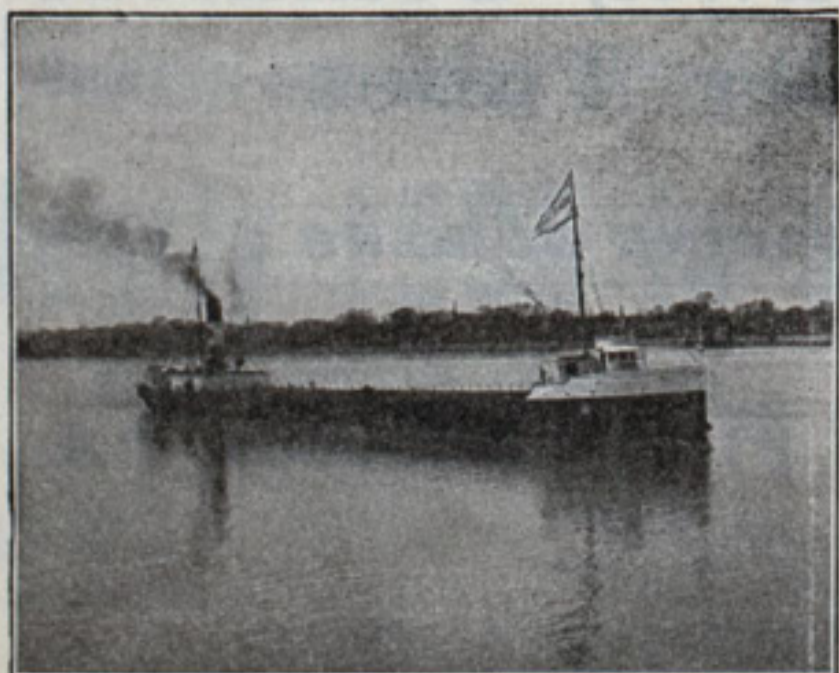
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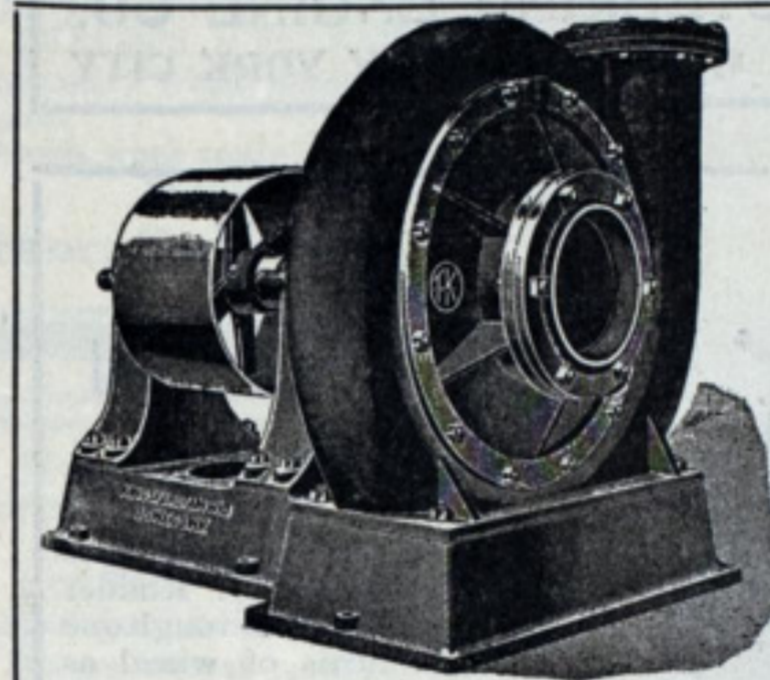
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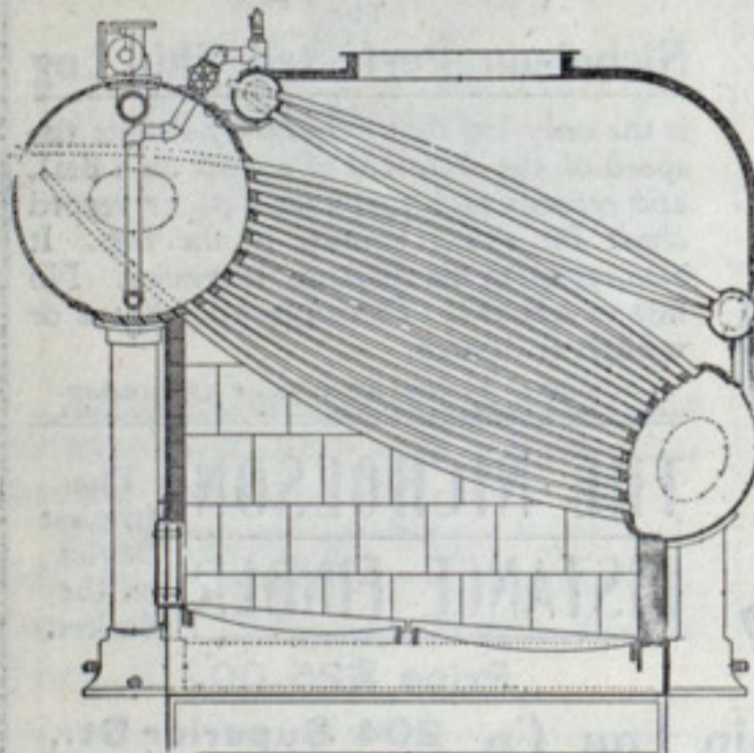


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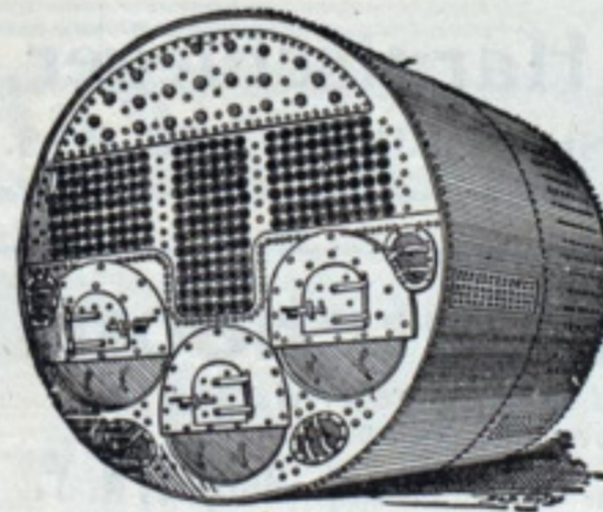
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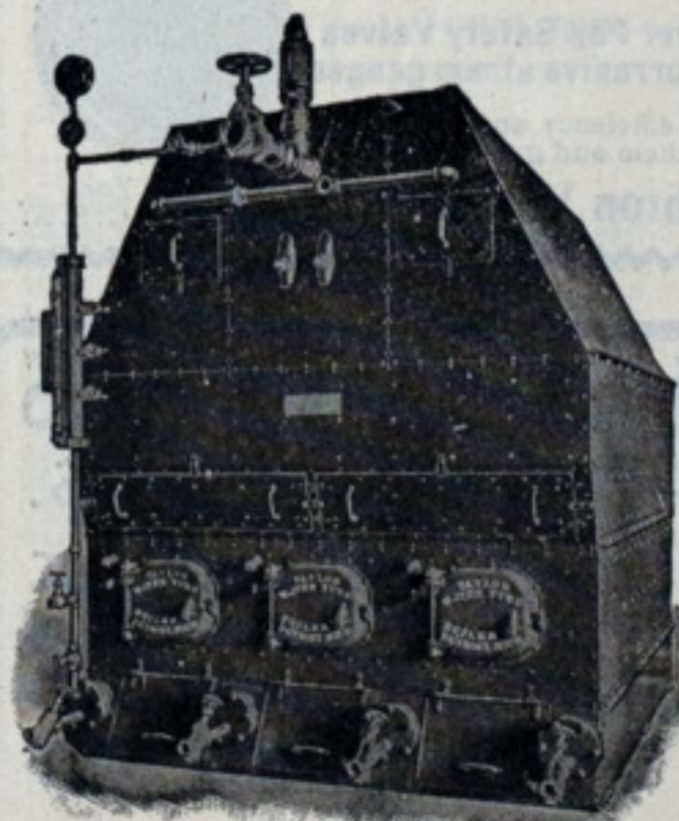
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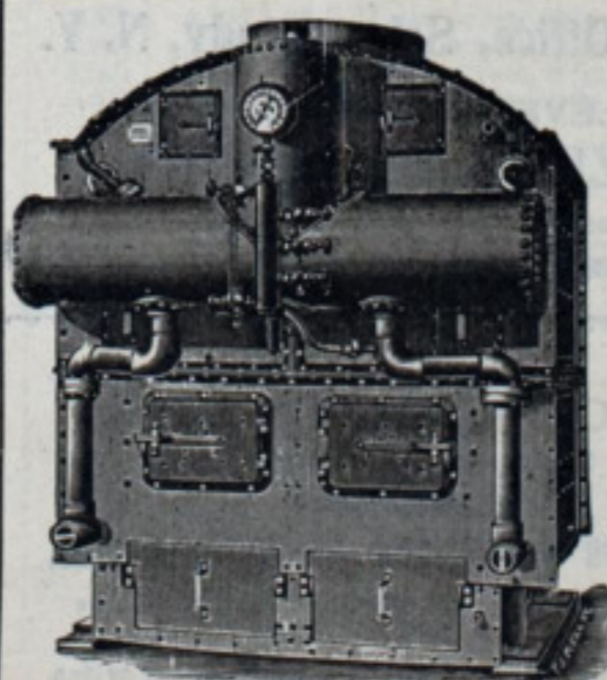
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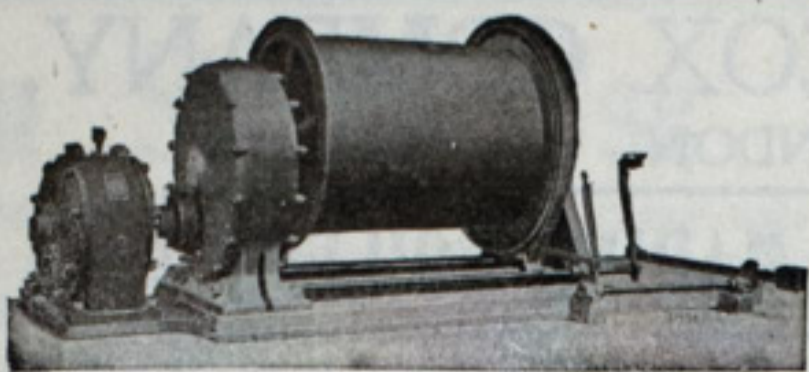
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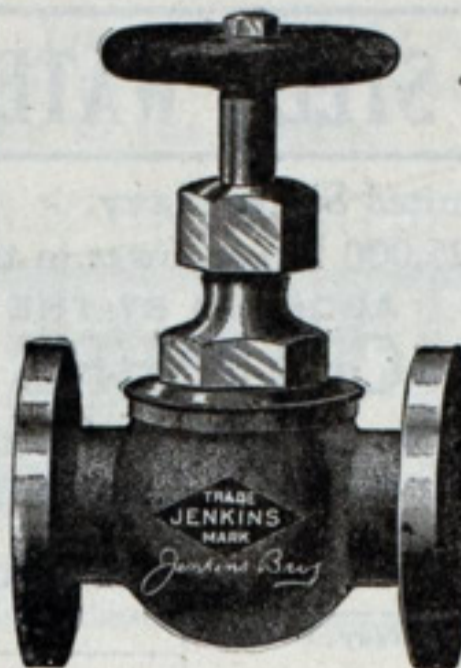
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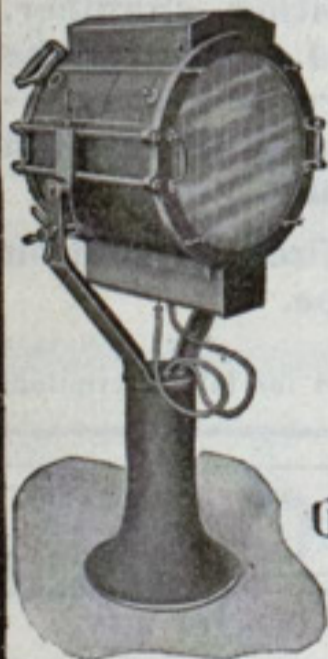
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